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THE ACCURACY OF MONTHLY, SIX-WEEKLY & TWO-MONTHLY WEIGHINGS IN ESTIMATING MILK YIELDS

By

PROFESSOR M. D. MCCARTHY, M.A., Ph.D., and PROFESSOR C. BOYLE, M.A., D.I.C., Ph.D., University College, Cork.

Under the Scheme for registration of non-pedigree dairy cattle as operated in this country members of Cow-Testing Associations are required to weigh to the nearest half-pound on one day in each week the morning and evening milk of each cow throughout the year while the animal is in milk. The particular day selected in the beginning becomes the weighing day throughout. For the purpose of the milk record, milk weighing must not commence until at least four days after the cow has calved, and the record must be continued until the total milk yield per day falls below five pounds, subject to the total period covered being not more than 45 consecutive weeks from the first appointed weighing day subsequent to the fourth day after calving. The Supervisor of the Association is required to pay a surprise visit to each member's herd at least once every six weeks to weigh the morning and evening milk of each cow and to take a composite sample of the morning and evening milk of each cow for a butterfat test.

The progress of cow-testing in Éire under the conditions of this Scheme has been disappointing. Notwithstanding generous financial assistance on the part of the State the number of cows on test has remained practically static for the past fifteen years. In order to effect an improvement in the milk yields of the dairy cattle in the country a more wide-spread adoption of the scheme for the registration of non-pedigree dairy cattle through the medium of Cow-Testing Associations is of fundamental importance. The Committee of Inquiry on Post Emergency Agricultural Policy in their Interim Report on Cattle and Dairying Industries (1) expressed the opinion that no appreciable expansion was possible until modifications were effected in the existing Cow-Testing Scheme. The Committee recommended considerable alterations in the existing scheme but had no data before it on which to base any recommendations concerning changes in the present system whereby owners of cows on test are required to weigh and record once a week the yield of all cows in their herds.

Various explanations have been offered from time to time as to why farmers have not adopted milk recording on a wider scale. Amongst these mention is made of the farmers' reluctance to weigh the milk of each cow weekly and to keep the necessary milk records. The present investigation was undertaken in order to ascertain the accuracy of milk yields calculated from the Supervisor's weighings *only*, thus eliminating all clerical work on the part of the farmer.

Numerous investigators have examined the errors involved in weighing and sampling milk at varying intervals throughout the lactation. McCandlish and McVicar (2) compared the actual yields, in the case of 24 lactations, with yields estimated on the basis of milk weighings at intervals of 10, 20, and 30 days throughout the lactations. The authors conclude that when the interval between weighings is 10, 20, and 30 days the average record obtained for a herd will not be materially altered, though the variations in individual records will be somewhat greater than where there is a shorter interval between the tests.

A Circular issued by the Bureau of Dairy Industry, United States Department of Agriculture (3) gives particulars of a study of 70 yearly individual cow records to determine if it is possible or practicable to cut down the cost of testing cows for production without affecting the accuracy and reliability of the results compared with actual production. The figures used in the study were obtained from the Minnesota Agricultural College. A Table is given which shows the variations from the actual yield of the seven different combinations of weighing and butterfat testing periods which were studied. The closest approximation to the actual was obtained by weighing the milk daily and testing for butterfat once in four weeks while the widest variation occurred where weighings and butterfat tests were carried out once in 12 weeks which was the longest interval studied.

Johansson (4) investigated the errors introduced in the milk and butterfat records of cows because of the practical necessity of calculating yields from sample figures obtained at intervals. In a series of observations the difference between the mean true yield as shown by daily recording and the mean calculated yield from recording at intervals was taken as a measure of the systematic error. The investigation included the published works of other workers where sufficient data were given in the original publication as well as original observations involving 100 lactation records and 94 yearly records. He found that the systematic errors of milk yield, fat yield, and fat percentage based on recording at intervals of 7, 14, 21, 28, 35, 42, and 60 days, the recording day being centrally placed in the recording period, were negligible.

Zorn and Gruhn (5) studied one hundred and nineteen lactations of 98 Black Pied Lowland cows. The average deviation of the calculated yield from the actual expressed as a percentage was 2.04, 2.60, 3.82, and 4.14 respectively for the 3, 4, 6, and 8 weeks recordings.

Tyler and Chapman (6) compared the accuracy of the method recommended by the Division of Dairy Herd Improvement Investigations, Bureau of Dairy Industry—the D.H.I.A. method—with a simplified method which they recommend. The D.H.I.A. method has become known as the centering method because the testing month is centered around an established testing day instead of coinciding with the calendar month. The authors suggest that since the method involves calculation of back-credit in cases of lactations beginning at certain times in the testing month, errors in calculation are

likely to be made. The authors suggested a simplified method of estima. milk records viz.:—the summation of the first ten testing day values multiplied by 30.5, as one which should result in less arithmetical error. In this study the statistical properties of records calculated by this simplified method were compared with the same cows' 305-day production records computed by the D.H.I.A. centering method and with actual production records obtained by adding the daily milk yields for the first 305 days. The authors conclude that the high correlations found between simplified, centred and actual milk records and between simplified and centred butterfat estimates indicate no important differences between simplified and centred schemes.

In a recent publication Kendrick (7) discusses various aspects of dairy herd improvement in the United States. Milk recording is carried out according to rules established by the American Dairy Science Association. These rules require that in each herd all weighing, sampling, and testing of milk must be carried out by the Supervisor. The Supervisor visits each herd in the association once a month. The weighing and sampling day is taken as the approximate centre of the testing period so that the monthly data will be for a period beginning 15 days before the testing day and ending 13 to 16 days (depending on the number of days in the month) after the testing day. The author states that numerous studies have shown that yearly records based on weights and tests for one day each month are satisfactory for all practical purposes being within 2 per cent. of the actual milk production and 3 per cent. of the butterfat production.

The same author gives detailed instructions for Supervisors in *The Cow Tester's Manual* (8).

MATERIAL.

Suitable data for the present investigation were available in the Milk Records of the University College, Cork dairy herd which has been recorded daily since it was established in 1929. The herd consists of non-pedigree dairy shorthorns which were milked and recorded to the nearest $\frac{1}{4}$ lb. twice daily. A milking machine was installed in 1929 and was used almost continuously up to the Emergency when hand milking was resorted to owing to restrictions on the use of electricity. During the period of machine milking the cows were stripped by hand. The present study embraced the records of 122 cows and 350 lactations. *No selection whatever was exercised in choosing the records to be used.* All normal records were taken in the order in which they were entered in the Milk Record Book. The only exclusions made were those in which the lactation began or ended with an abortion, and in a few cases where the cow was used for suckling calves and recording ceased in mid-lactation. The milk of each cow was tested for butter-fat at approximately monthly intervals throughout. Butter-fat tests and yields are not included in the present investigation which is confined to a study of the accuracy of monthly, six weekly and two-monthly weighings in estimating milk yields.

The number of lactations available from each cow varied and is shown in the following table together with the average yield of cows from which the same number of lactations were investigated. The peak shown in the table at the seventh lactation is due to the inclusion in this group of one very high yielder.

TABLE 1.
Average Actual Yield of Cows per Lactation.

Total Lactations per Cow	Cows	Lactations	Average Yield
			lb.
1	49	49	5,545.6
2	26	52	5,491.2
3	13	39	5,133.2
4	7	28	5,778.3
5	7	35	7,430.2
6	6	36	7,007.3
7	4	28	9,148.0
8	7	56	7,013.9
9	3	27	6,613.8
TOTAL ..	122	350	6,454.5

The average yield per lactation of the 350 lactations used was 6,454.5 lb. and the estimated standard deviation of the distribution of yield was 2,187.4 lb. In individual cases the yield ranged from 1,544 lb. to 16,525 lb. The distribution of the yields in 500 lbs. groups is shown in Table 2 and the corresponding totals are shown diagrammatically in Fig. 1.

TABLE 2.
Distribution of Actual Yields in 500 lb. Groups.

Yield	No. of Lactations	Yield	No. of Lactations
(000 lb.)		(000 lb.)	
1.5—2.0	3	9.5—10.0	4
2.0—2.5	3	10.0—10.5	6
2.5—3.0	4	10.5—11.0	4
3.0—3.5	4	11.0—11.5	2
3.5—4.0	16	11.5—12.0	1
4.0—4.5	27	12.0—12.5	—
4.5—5.0	32	12.5—13.0	1
5.0—5.5	34	13.0—13.5	—
5.5—6.0	41	13.5—14.0	1
6.0—6.5	29	14.0—14.5	1
6.5—7.0	37	14.5—15.0	—
7.0—7.5	19	15.0—15.5	1
7.5—8.0	17	15.5—16.0	—
8.0—8.5	25	16.0—16.5	—
8.5—9.0	28	16.5—17.0	1
9.0—9.5	9	Total ..	350

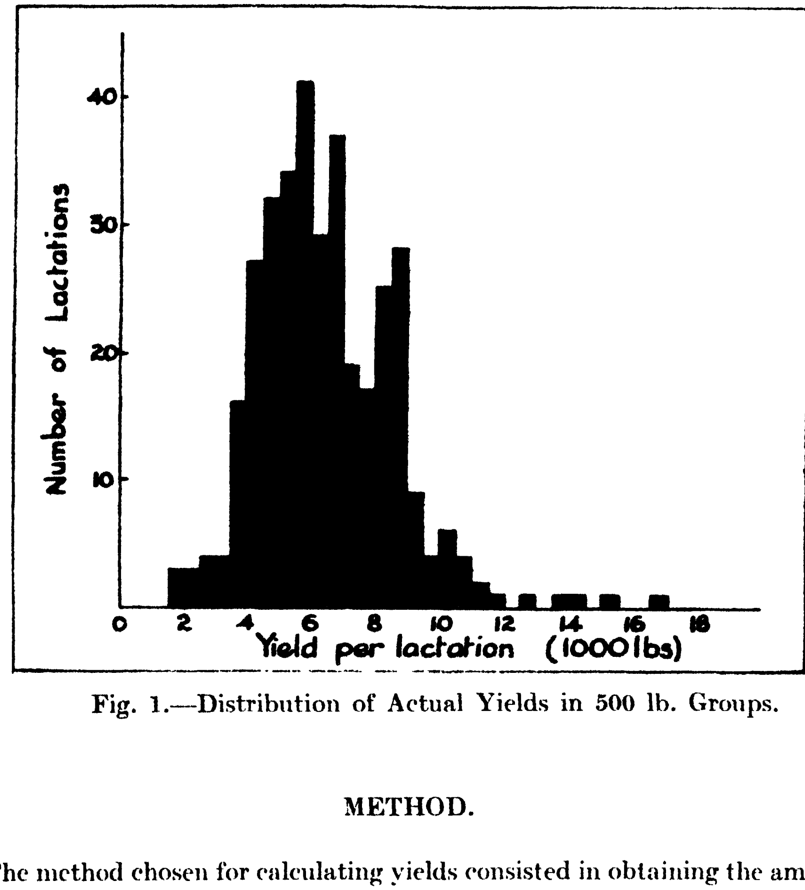

Fig. 1.—Distribution of Actual Yields in 500 lb. Groups.

METHOD.

The method chosen for calculating yields consisted in obtaining the amount of milk yielded by each cow on a fixed day once every month, every six weeks, or every two months according to the interval chosen. The yield on the selected day was multiplied by the appropriate number of days in the period whose centre was the day on which the milk was weighed. This was taken as the "Calculated Yield" for the appropriate period and the sum of all the periods in any lactation was taken as the "Calculated Yield" of the cow for that lactation, on the basis of the selected intervals. This was compared with the "Actual Yield" got by adding the daily yields for the lactation.

"Use of the centering method avoids the inflation or deflation that results when production is calculated on a calendar-month basis, from tests made near the beginning or end of the month. Except for a short time after a cow freshens, her production is always declining [unless the feeding method is radically altered during the lactation]. Therefore, if the tester visits the farm near the beginning of a month and calculates the month's production on the basis of his tests for that day, the calculated production for the month is higher than the actual production, but if he tests the herd near the end of

the month, when production has declined, then the calculated production will be lower than the actual production for the month. The records of herds tested at the beginning of a month would be inflated and the records of herds tested near the end of the month would be deflated, as compared to actual production" (8). Thus it is essential to use the centering method to aviod a biassed estimation of the yields. The actual method of choosing a "testing-month" for each herd which a supervisor visits is well set out in the publication from which the above is quoted, *The Cow Tester's Manual* issued by the U.S. Department of Agriculture. It is also pointed out there that the surprise element can be maintained by varying the visits to each farm as much as two days before or two days after the regular testing-day established for the herd. Such a variation is left out of account in calculating the yield, which is always made on the basis of the regular testing day for each herd, and makes no appreciable difference to the calculated yields.

The only difficulty in this method for calculating the yield of any lactation occurs at the beginning and end of the lactation. If a cow came into production before the weighing-day in any testing-period the yield on the weighing-day was multiplied, not by the whole length of the period, but by the number of days during that period on which the cow produced milk. Allowance was, of course, made for the four non-recorded days after the cow calved. If, on the other hand, a cow came into production after the weighing-day during any period the figure used to estimate the production during that period was the yield of the cow on the weighing-day in the next period. This was multiplied by the appropriate number of days during which the cow produced milk in the first period and the result taken as the calculated yield for that period. A similar adjustment was made at the end of the lactation where necessary.

The term "Error" is used for the quantity Calculated Yield minus Actual Yield and "Percentage Error" means the Error expressed as a percentage of the Actual Yield. Both "Error" and "Percentage Error" may, of course, be either positive or negative according as to whether the Calculated Yield exceeds or falls short of the Actual Yield. It will be convenient to use "Absolute Error" and "Absolute Percentage Error" for the corresponding quantities when the sign is disregarded.

DISTRIBUTION OF ERRORS AND OF PERCENTAGE ERRORS.

The frequency distributions of the errors and percentage errors for calculated yields based on monthly, six-weekly, and two-monthly weighings are shown in Tables 3 and 4.

Table 3.

Frequency Distributions of Actual Errors in Calculated Yields.

(+ *indicates positive errors.* — *negative errors.*)

Error	Monthly		Six-weekly		Two-monthly	
	+	—	+	—	+	—
lb.						
0— 49¾	46	46	30	35	23	28
50— 99¾	33	28	32	29	23	29
100— 149¾	34	28	30	28	26	27
150— 199¾	35	17	20	19	24	18
200— 249¾	21	10	16	11	16	7
250— 299¾	10	11	12	13	15	10
300— 349¾	3	4	7	7	10	8
350— 399¾	7	4	15	4	10	5
400— 449¾	5	1	10	3	12	10
450— 499¾	—	—	3	3	6	5
500— 549¾	2	2	4	3	5	5
550— 599¾	1	1	2	—	4	4
600— 649¾			—	4	1	5
650— 699¾		—	1	1	1	3
700— 749¾		1	—		—	1
750— 799¾			—	1	1	1
800— 849¾			—	1	—	—
850— 899¾			1	1	—	3
900— 949¾			—	—	—	—
950— 999¾			—	—	—	—
1000—1049¾			1	1	1	1
1050—1099¾			1	—	1	—
1100—1149¾				1		1
Total ..	197	153	185	165	179	171

Table 4.

Frequency Distributions of Percentage Errors in Calculated Yields.
(+ *indicates positive errors,* — *negative errors.*)

Percentage Error	Monthly		Six-weekly		Two-monthly	
	+	—	+	—	+	—
%						
0— 0.99	55	56	37	39	25	33
1.00— 1.99	45	36	41	37	28	38
2.00— 2.99	40	23	25	33	30	21
3.00— 3.99	23	13	18	21	25	16
4.00— 4.99	21	10	18	12	24	13
5.00— 5.99	3	7	18	4	16	12
6.00— 6.99	2	3	11	4	12	8
7.00— 7.99	4	3	6	4	4	9
8.00— 8.99	3	1	3	3	6	2
9.00— 9.99	1	1	2	1	2	5
10.00—10.99			3	2	1	4
11.00—11.99			1	—	4	3
12.00—12.99			—	1	—	2
13.00—13.99			—	1	—	—
14.00—14.99			1	—	—	2
15.00—15.99			—	2	1	—
16.00—16.99			—	—	—	1
17.00—17.99			—	1	—	—
18.00—18.99			—		—	—
19.00—19.99			1		1	2
Total ..	197	153	185	165	179	171

The greater accuracy of monthly in comparison with six-weekly or two-monthly weighings, particularly in avoiding very large errors, is clearly shown by the absence of large "tails" in the monthly distributions. The range of error in each case is shown in Table 5. The range in the case of monthly weighings is round about half that for either of the other periods. The range, however, is considerably affected by the chance inclusion of one large positive or negative error. The decrease in concentration around the mean with increase in the weighing interval is perhaps better appreciated by coniderations of the diagrams in Fig. 2 and Fig. 3 which represent the totals in Tables 3 and 4.

Table 5.

Range of Values in Distributions of Error and of Percentage Error.

Interval	Error	Percentage Error
	lb.	%
Monthly	+590½ to — 700¼	+9.48 to — 9.60
Six-weeks	+1052 to —1113¾	+19.69 to —17.88
Two-months	+1064¾ to —1139¼	+19.30 to —19.72

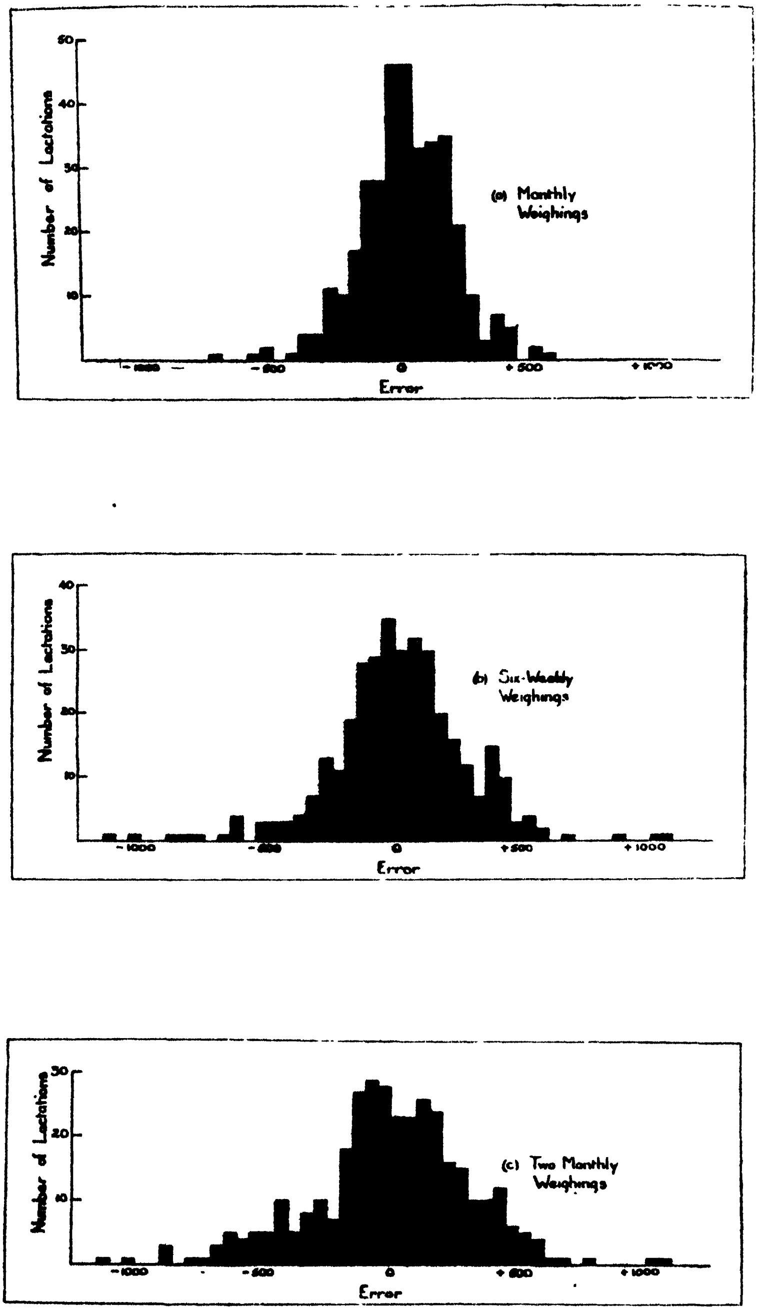

Fig. 2. Frequency Distributions, in 50 lb. groups, of errors in yields calculated from (a) monthly, (b) six-weekly, (c) two monthly-weighings.

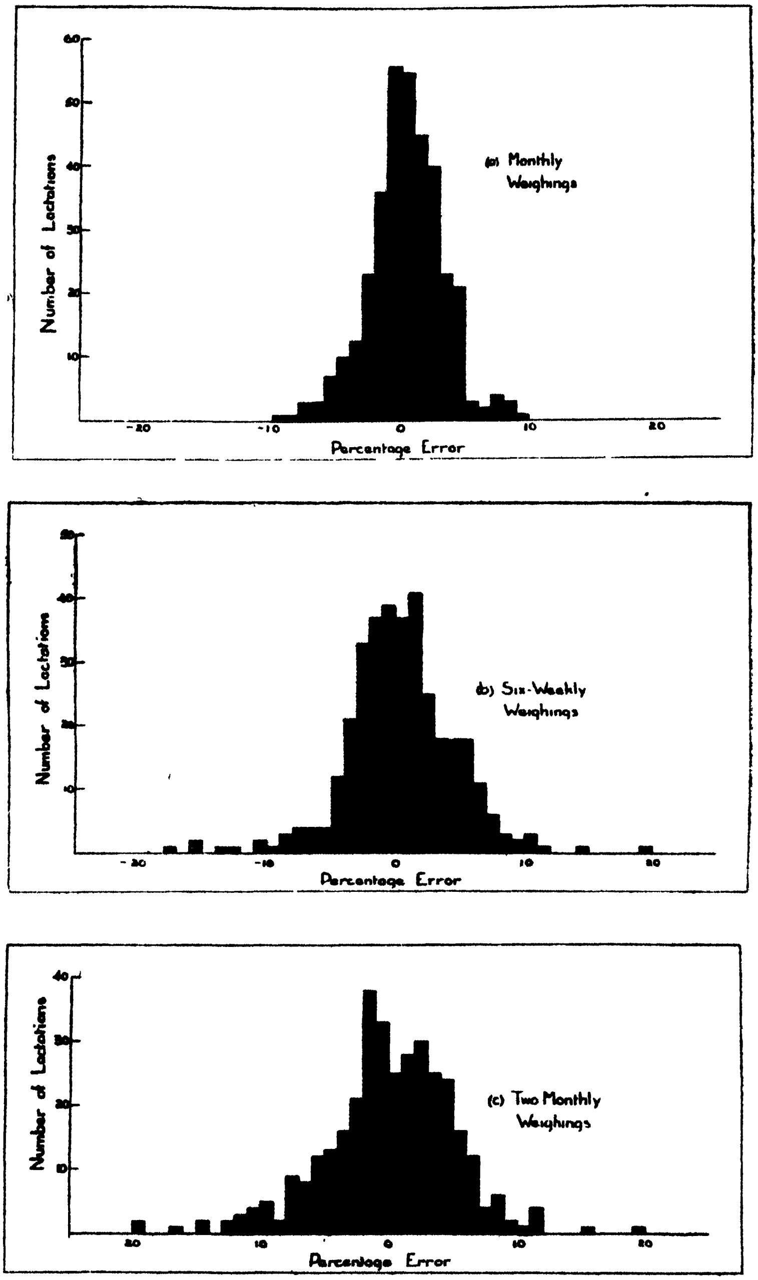

Fig. 8. Frequency Distributions in 1 per cent. groups of percentage errors in yields calculated from (a) monthly, (b) six-weekly, (c) two-monthly weighings.

It would be still easier to appreciate visually the increase in variance, or "spread" of the errors, or percentage errors, if the diagrams (a), (b) and (c) in each of Fig. 2 and Fig. 3 were superposed. This is not readily possible with any clarity but the same result is clearly illustrated in Fig. 4, where the normal error curves fitted to the histograms of the distributions of percentage errors in Fig. 3 are drawn on one diagram. A substantially similar picture would be shown if the curves fitted to the errors, instead of the percentage errors, were drawn.

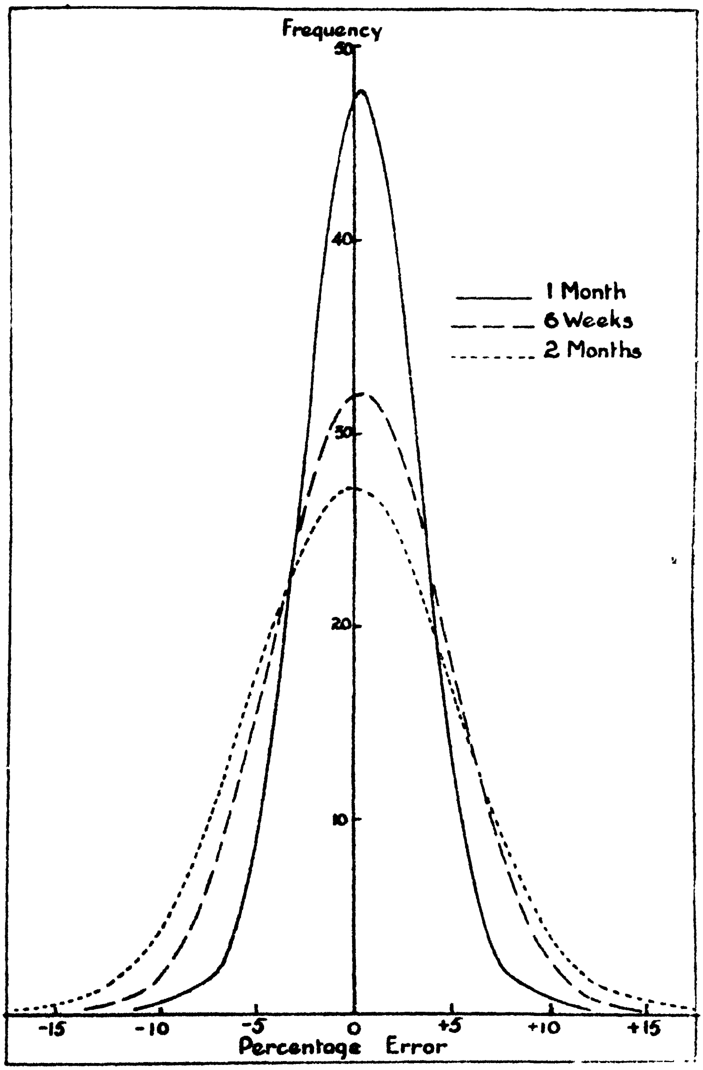

Fig. 4. Normal Curves fitted to frequency distributions of percentage errors in yields calculated from (a) monthly, (b) six-weekly, (c) two-monthly, weighings.

STATISTICAL PARAMETERS FOR ERROR AND PERCENTAGE ERROR DISTRIBUTIONS.

The arithmetic mean both of the errors and of the percentage errors, their standard deviations, the standard deviation of the means and the quantity t (= Arithmetic Mean/Standard Deviation of the Mean) were calculated and are shown in Table 6.

TABLE 6.

Estimated Statistical Parameters for Distributions of Errors and of Percentage Errors.

INTERVAL	Mean		Standard Deviation		Standard Deviation of Mean			
	Error	Per cent. Error	Error	Per cent. Error	Error	Per cent. Error	Error	Per cent. Error
	lb.	%	lb.	%	lb.	%		
Month ..	+23.57	+0.403	181.11	2.925	9.68	0.156	2.435	2.577
Six weeks ..	+16.70	+0.371	271.28	4.340	14.50	0.232	1.152	1.600
Two months	+ 1.03	+0.006	312.77	5.135	16.72	0.274	0.062	0.022

The means both of the distributions of errors and of percentage errors are positive in all cases, decreasing as the interval between weighings increases. If, as might be expected, no bias existed, then the mean of all the distributions should be zero. The values of t enable the significance of the deviations of the means from zero to be tested in each case. With the number of observations available t would, by chance, be greater than 1.967 in 5 per cent., and greater than 2.590 in 1 per cent. of all cases. Judged by this test the values got for t in the case of the six-weekly and two-monthly weighings are not significantly large for the errors or for the percentage errors. The values of t got for both the monthly distributions are above the 5 per cent. level of significance but below the 1 per cent. level. There is therefore a certain amount of evidence that the monthly weighings tend, very slightly, to over-estimate the yield. This is confirmed by the fact that, in this case, 197 positive errors were found and as against 153 negative ones. At any rate the over-estimation is extremely small, only 2.36 gallons per lactation, or a percentage of 0.4, and this is much too small to make any practical difference. We may therefore conclude that there is no appreciable bias in estimating the yield on the basis of monthly, six-weekly, or two-monthly weighings.

The "probable error" is, of course, got by multiplying the standard deviation by 0.67449. Its value is 122.2 lb., 183.0 lb. and 211.0 lb. in the case of the

actual errors and 1.97 per cent., 2.93 per cent. and 3.46 per cent. in the case of the percentage errors with monthly, six-weekly and two-monthly weighings respectively.

ACCURACY OF CALCULATED YIELDS AT DIFFERENT INTERVALS.

Having thus shown that no bias of any practical significance is introduced by estimating the yield from periodical weighings in the manner suggested, it remains to decide at what intervals the weighings should be taken in order that the calculated yields may have sufficient accuracy. The degree of accuracy required is a matter for prior decision but it is suggested that for a method of estimation to be satisfactory, the calculated yield should in 95 per cent. of all cases lie within a margin of about $\pm$ 5 per cent. of the actual yield. Whatever interval between weighings is adopted a few unusual cases will occur with large errors but this is the price which must be paid for the adoption of the system of periodic weighings instead of the recording of every pound of milk that each cow gives. It also appears from Fig. 6 that even with the present system, which in practice involves weekly weighings, all that can be said is that 95 per cent. of the recorded yields lie within $\pm$ 1.25 per cent. and 99 per cent. within $\pm$ 1.65 per cent. of the actual yields.

The accuracy which will be got in the estimated yields is best measured by the standard deviation of the errors, or of the percentage errors, which are shown in Table 6. To judge the relative accuracy of the three periods tested we may take the standard deviations in the case of monthly weighings to be 100 and express the others proportionately as is done in Table 7. It thus appears that we get a "spread" in the case of six-weekly weighings

TABLE 7.
Relative Size of Standard Deviations for Different Intervals.

Interval	Errors	Percentage Errors
Month	100	100
Six weeks	149.8	148.4
Two months	172.7	175.6

about once and one-half as large, and in the case of two-monthly weighings about once and three-quarters as large, as with monthly weighings.

The implications of the above results are best expressed by determining the "Confidence Intervals" for the errors or percentage errors. By the term "95 per cent. (or 99 per cent.) Confidence Interval" is meant that range of

values within which in the case of future estimations, carried out on the same basis as in the present instance on similar data, 95 per cent. (or 99 per cent.) of the results may be expected, in the long run, to lie. Table 8 shows the confidence intervals corresponding to 50 per cent., 95 per cent. and 99 per cent. "confidence coefficients" for both errors and percentage errors.

TABLE 8.

50 per cent., 95 per cent., 99 per cent., Confidence Intervals for Errors and Percentage Errors.

INTERVAL	ERRORS			PERCENTAGE ERRORS		
	50%	95%	99%	50%	95%	99%
	lb.	lb.	lb.	%	%	%
Month ...	+146 to — 99	+380 to —333	+493 to —446	+2.38 to —1.57	+ 6.16 to — 5.35	+ 7.98 to — 7.17
Six weeks ...	+200 to —166	+550 to —517	+719 to —686	+3.30 to —2.56	+ 8.91 to — 8.17	+11.61 to —10.87
Two months	+212 to —210	+616 to —614	+811 to —809	+3.47 to — 3.46	+10.11 to — 10.10	+13.31 to —13.30

Thus with monthly weighings half the records should show percentage errors of between +2.38 per cent. and —1.57 per cent. while 95 per cent. should lie between +6.16 per cent. and —5.35 per cent. and so on.

The 50 per cent., 95 per cent. and 99 per cent. confidence intervals for the percentage errors are shown in diagram form in Fig. 5.

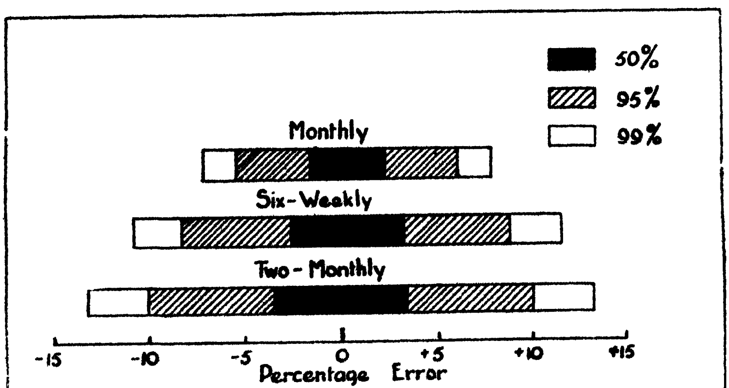

Fig. 5. Chart of Confidence Intervals for Percentage Errors.

Kendrick (7) states that "Numerous studies have shown that yearly records based on weights and tests for 1 day each month are satisfactory for all practical purposes, being within 2 per cent. of the actual milk production and 8 per

cent. of the butter-fat production." He does not make it clear what proportion of the yields lie within the specified limits but if the data on which he based his results are comparable to those used in the present enquiry it looks as if he has taken the, so-called, probable error to define the limits. This means, for all practical purposes, that he uses the 50 per cent. confidence intervals already tabled.

The confidence interval, in any case, is determined by calculating the quantities Mean $\pm$ t times the Standard Deviation, where the factor t depends on the number of items in the calculation and on the confidence coefficient adopted. Thus the length of any confidence interval calculated from a given number of items is directly proportional to the standard deviation. It is desirable to consider the probable "spread" of the errors for smaller intervals between the weighings than those used in the present enquiry, and for this purpose the standard deviations of the percentage errors, given in Table 6, are graphed at the appropriate time intervals in Fig. 6. The positions of the points marked suggest that it is not unreasonable to assume in this case a linear relationship between the standard deviation and the length of the interval. The fitted straight line must, of course, pass through the origin

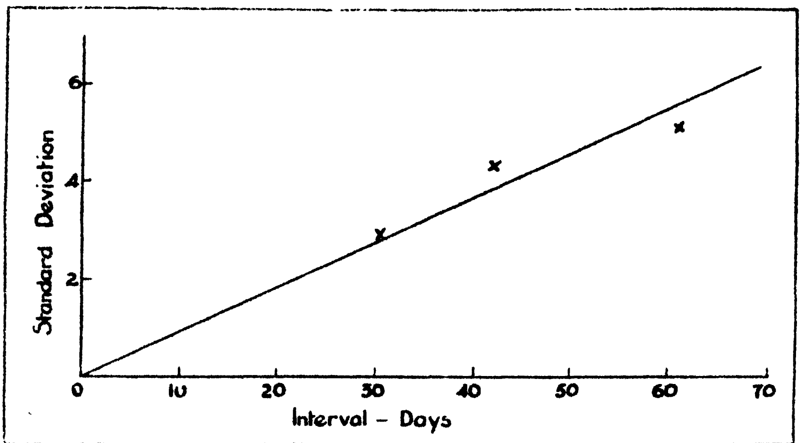

Fig. 6. Graph of standard deviations of percentage errors at intervals used together with fitted straight line.

since complete accuracy is obtained when all the milk is weighed. The line through the origin fitted by least squares to the points graphed is also shown on Fig. 6 and this line gives estimated standard deviations of 0.64 per cent. for weekly, 1.28 per cent. for fortnightly, and 1.91 per cent. for three-weekly intervals between the readings. The corresponding 95 per cent. confidence intervals are, roughly, $\pm$ 1.25 per cent., $\pm$ 2.5 per cent and $\pm$ 3.75 per cent and the 99 per cent confidence intervals are, roughly, $\pm$ 1.65 per cent., $\pm$ 3.3 per cent. and $\pm$ 5.0 per cent. respectively.

It thus appears that the suggested standard, of 95 per cent. of all cases within ± 5 per cent. of the actual yield, will almost be attained with monthly weighings while the shortening of the interval to three weeks would give calculated yields of which 99 per cent. would be within the prescribed limits.

CORRELATIONS.

The average yield, 6,454.5 lb. per lactation of the lactations used in the enquiry is fairly high relative to the average yield of all the cows in the country which has been estimated as not exceeding 4,000 lb. by the Committee of Enquiry on Post-Emergency Agricultural Policy (1). In order to make sure that the results in the present paper apply equally well to the general bulk of cattle in the country it is necessary to consider the correlation between error and yield. Table 9 shows the correlations calculated, for the material used, of the actual yield of the cows with the error and percentage error both when the sign of the error is taken into account and when

TABLE 9.

Correlation with Actual Yield of (i) Error, (ii) Percentage Error, (iii) Absolute Error, (iv) Absolute Percentage Error and (v) Calculated Yield.

Interval	Error (i)	Percentage Error (ii)	Absolute Error (iii)	Absolute Percentage Error (iv)	Calculated Yield (v)
Month	+0.009	—0.039	+0.231	—0.151	+0.9964
Six weeks ..	—0.069	—0.078	+0.234	—0.119	+0.9919
Two months ..	—0.023	—0.006	+0.125	—0.128	+0.9894

it is disregarded. The correlations between the actual and calculated yields are also shown.

If no correlation existed between 350 pairs of items chosen at random we might expect to get correlation coefficients as far from zero as ± 0.105 in 95 per cent., as ± 0.137 in 99 per cent. and as ± 0.175 in 99.9 per cent. of all cases. Thus the correlation coefficients of error and percentage error with yield as given in Table 9, when the signs of the errors are taken into account, are such as might well arise by chance variations. This means that there is no evidence that high-yielding cows give positive errors, or percentage errors, and low-yielding cows negative errors or vice versa. In other words the conclusion come to in regard to the lack of appreciable bias in estimating yields by periodic weighings applies equally to cows of high and low yield.

The results in Table 9 show that there is definite evidence of positive correlation between size of error, when the sign is neglected, and the actual yield of the cows. The relevant correlation coefficients in the case of monthly and six-weekly intervals (+ 0.231 and + 0.234 respectively) are too high to be attributable to chance variations, while in the case of two-monthly intervals a coefficient as large as that obtained (+ 0.125) would occur by chance only about once in fifty times. Thus there is a certain, though not extremely marked, tendency for large absolute errors to be associated with high yields. On the other hand there is evidence, which is not quite so definite as in the above case, of an association between high yield and a small absolute *percentage* error. All the relevant coefficients are negative though not so large as in the case of the absolute errors. The coefficient in the case of monthly intervals (—0.151) is significant at the 1 per cent. level, the six-weekly one (—0.119) is significant at the 5 per cent. level but not at the 2 per cent. level, while the two-monthly coefficient (—0.128) is significant at the 2 per cent. but not at the 1 per cent. level.

It is thus clear that, as the average yield per lactation of the cases used in the present enquiry is above that for the general cow population of the country, the bounds of the confidence intervals for the percentage errors should be somewhat extended and the bounds in the case of the actual errors somewhat contracted so that the results may be applied to the general cow population at the present level of production. The change needed is, however, very much less if the results are to be applied to cows already under test as these, in 1941, had an average yield of 5,280 lb. (1) as compared with 6,454.5 lb. in the case of the present enquiry. The conclusions as to the relative accuracy of the different periods are not affected and the difference does not invalidate the statement that it appears desirable to make weighings at monthly intervals.

It is not possible to estimate how much the standard deviations, and therefore the confidence intervals have to be altered for variations in the average yield but what can be done is to obtain the regression equations of the absolute error and absolute percentage error on yield. These enable estimates of the mean values of these quantities to be calculated for average yields of 4,000 lb. and 5,280 lb. corresponding roughly to the average yield of all the cows in the country and to all the cows in Cow-Testing Associations. These values of the mean absolute error and of the mean absolute percentage error thus calculated are shown in Table 10. These values are somewhat larger than the "probable error," being probably between 0.75 and 0.8 of the corresponding standard deviations, and indicate roughly how the limits of accuracy are affected by changes in yield.

TABLE 10.

Estimated Mean Values of Absolute Error and Absolute Percentage Error for Yields of 4,000 lb., 5,280 lb. from Regression Equations and Values found for Mean Yield of 6,454.5 lb.

INTERVAL	ABSOLUTE ERROR			ABSOLUTE PERCENTAGE ERROR		
	Yield 4,000 lb.	Yield 5,280 lb.	Yield 6,454.5	Yield 4,000 lb.	Yield 5,280 lb.	Yield 6454.5 lb.
	lb.	lb.	lb.	%	%	%
Month	108.1	124.4	139.4	2.69	2.41	2.25
Six weeks ..	147.6	173.7	197.6	3.58	3.37	3.18
Two months ..	225.4	210.4	239.2	4.35	4.09	3.85

The correlations between the actual yield and the calculated yield are high, decreasing somewhat with length of interval. Similar coefficients have been used by some authors, *e.g.* Tyler and Chapman (6), to justify various methods of estimating yields. It should be pointed out that, in general, even such high correlations do not of themselves give an adequate measure of the satisfactoriness of a method of estimation.*

CONCLUSIONS.

(1) No appreciable bias is introduced in estimating the yield of cows, by the method used, from monthly, six-weekly or two-monthly weighings.

(2) Monthly weighings give calculated yields which 50 times out of 100 have errors of between + 2.38 and —1.57 per cent. of the actual yield and 95 times out of 100 have errors of between + 6.16 per cent. and —5.35 per cent. of the actual yield.

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* If x = actual yield of a cow, y = calculated yield and e = error = $y - x$, while σ_x, and σ_y and σ_e are the respective standard deviations and r_{xy} and r_{xe} the correlation coefficients of x with y and of x with e respectively, it is readily seen that

$$\sigma_y^2 = \sigma_x^2 + \sigma_e^2 + 2\sigma_x\,\sigma_e\,r_{xe} \text{ and } r_{xy} = (\sigma_x + \sigma_e r_{xe})/\sigma_y.$$

Usually σ_e is small relative to σ_x and we may expand r_{xy} in ascending powers of σ_e/σ_x getting

$$r_{xy} = 1 - \tfrac{1}{2}\left(1 - r_{xe}^2\right)\sigma_e^2/\sigma_x^2 + r_{xe}\left(1 - r_{xe}^2\right)\sigma_e^3/\sigma_x^3 \ldots .$$

If, as in the present case, r_{xe} is negligibly small and σ_e/σ_x is round about 0.1 is clear that r_{xy} is about +0.995. At any rate an increase in the variance of the actual yields will increase r_{xy}, and a decrease in the variance will decrease r_{xy} even with no change in σ_e which is the appropriate measure of the accuracy of the estimation method.

(3) The limits of error in the case of six-weekly weighings are about once and one-half as wide, and in the case of two-monthly weighings about once and three-quarters as wide as in the case of monthly weighings.

(4) There is no correlation between error, or percentage error, and actual yield when the sign of the error is taken into account.

(5) There is some tendency to increase in size of error with increase of yield, and a contrary tendency to decrease in size of the percentage error with increase of yield.

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A SURVEY OF FLAX DISEASES IN ÉIRE IN 1945.

By

PROFESSOR R. McKAY, D.Sc., and J. B. LOUGHNANE, M.Sc.,
Department of Plant Pathology, University College, Dublin.

The area under flax in Ireland has always been subject to considerable fluctuation, this depending chiefly on the speculative nature of the crop owing to the instability of prices. From the time of sowing the seed until the crop is ready for pulling—approximately 100 days—flax occupies the land for a shorter period than any other farm crop in these islands. If, however, weather conditions are not favourable during the greater part of this time the crop may be an unprofitable one. Despite this risk, farmers in flax growing areas are always willing to grow the crop when a market for it is assured. In 1939, at the outbreak of the war just terminated, the area under flax in the twenty-six counties was 4,128 acres, but in 1945, under the inducement of guaranteed prices and the greatly improved and increased provisions made for scutching the crop, the area under flax had risen to over 32,000 acres.

Following the note published in 1944 by Lafferty and McKay on the occurrence of "Pasmo" Disease in this country*, a conference was held with officials of the Department of Agriculture. Subsequently, by arrangement with the Flax Development Board, Ltd., a survey of flax diseases was undertaken in 1945, and hence the present article. Two of the diseases here mentioned, *viz.* Rhizoctonia, *Corticium Solani*, and "Pasmo" Disease, *Sphaerella linorum* are new records for flax in Ireland.

All the flax seed used for the entire acreage under fibre flax cultivation was supplied under an arrangement made with the British Ministry of Supply, and it is understood the whole of this seed was treated with "Nomersan" or other recognized flax seed dressing. As the whole acreage was directly under supervision of Flax Inspectors employed by the Department of Agriculture and the Flax Development Board, Ltd., Dublin, and as the authors worked in close co-operation with these men, an unique opportunity presented itself to obtain information relative to diseased crops.

Climatic Conditions.—The weather during March and April was favourable for spring cultivation and many fields of flax were then sown. Severe frost, however, occurred towards the end of April and again during the first week

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*Lafferty, H. A. and R. McKay. "Pasmo" Disease on Wild Flax, *Linum angustifolium.* Nature, Vol. 154, page, 709, December 2, 1944.

in May. This cold spell was accompanied by harsh winds which continued for some time, and although the frost itself did not appear to be very injurious to the flax, brairds which were just appearing at this time seemed to be considerably checked. With the advent of rain later in May the majority of the crops recovered and the remainder of the growing season, being showery throughout, was very favourable for the crop. In Co. Cork, the season was rather too wet towards pulling time and some losses were experienced through lodging, but in the northern areas, where sowing was somewhat later, the crops towards ripening benefited by the improvement of the weather which occurred in July.

A total of 96 samples of flax were sent in for examination between the 7th May and the end of September. An analysis of the different diseases found and the varieties affected is presented in the accompanying Tables I and II.

The examination of specimens forwarded by Flax Inspectors was supplemented by field inspections by the authors during the months of June and July.

ANALYSIS OF FLAX SAMPLES RECEIVED.

TABLE I.

	Samples
FUNGI:	
Seedling Blight, *Colletotrichum linicola*	6
Damping Off, Rhizictonia—*Corticium Solani*	6
,, ,, Fungi not identified	3
Browning and Stem Break, *Polyspora Lini*	7
Rust and Firing, *Melampsora Lini*	12
Phoma spp.	14
"Pasmo" Disease, *Sphaerella linorum*	2*
Grey Mould, *Botrytis cinerea*	6
INSECT INJURY:	
Flea Beetle, *Longitarsus parvulus*, Payk.	10
Capsid, *Calocoris bipunctatus*, F.	1
NON-PARASTIC:	
Due mainly to unfavourable climatic or soil conditions	24
Hail injury	2
Flax-Droop	2
Fasciation	1
TOTAL	96

*One of the cases of "Pasmo" occurred on a fibre flax but the name of the variety could not be ascertained: the second sample affected by "Pasmo" was an oil flax, variety Redwing. The remaining 11 samples were not named.

The varieties of flax referred to overleaf were made up as follows:—

TABLE II.

	Liral Prince	Liral Monarch	Liral Crown	Gossamer
Seedling Blight	1	2	2	—
Damping Off	5	1	1	..
Browning	1	1	4	---
Rust	1	8	3	--
Phoma	3	7	4	—
Grey Mould	1	2	2	—
Flea Beetle	2	3	3	1
Non-parasitic	12	4	6	1
Flax Droop	--	1	1	-
	26	29	26	2

Seedling Blight, *Colletotrichum linicola.* The first specimens showing this disease were forwarded on 8th May and others came to hand throughout May and June. As infection was severe on the cotyledons of quite a number of plants in the different samples sent in for examination, it was evident that the seed treatments employed were not entirely effective. A rather unusual attack of this fungus was seen towards the end of July on plants ready for pulling, this occurred as a severe outbreak of disease all over the upper foliage.

Rhizoctonia, *Corticium Solani.* Attacks of this fungus on flax do not appear to have been hitherto reported in this country. In addition to the identification of the fungus on seedlings forwarded for examination, where it was causing constriction of the stems and damping-off, diseased plants were also found during the tour of inspection. These were generally associated with gravelly patches in the field, the affected plants being stunted in growth, the foliage pallid or sickly yellow in colour and the underground portion of the stem brown with lesions. The finding of the fungus on such plants is of course not complete evidence that it was the cause of the stunting and sickly appearance, but as *Corticium Solani* has been recorded in other countries as attacking flax, and as this fungus was invariably present on the root system of affected plants there is little doubt but that it was the cause of the trouble. At the same time, further investigation of the parasitism of *C. Solani* on flax appears desirable.

Browning and Stem Break. *Polyspora Lini.* The first diseased specimens came to hand on 5th June, and the disease was evidently severe enough in some places to attract the attention of the local inspector. At the field inspection in the northern counties a number of affected crops were seen but this disease did not appear to be of serious importance.

Rust, *Melampsora Lini.* This disease was prevalent in Co. Cork during the month of June, the teleutospore stage—usually referred to as "firing"—being already well developed in many fields. In Co. Meath at the July inspection some "firing" was noticed on crops in the process of being pulled. However, as one proceeded northwards the incidence of the disease became much less, and in the majority of fields only the uredospore stage of the rust occurred, infection being in an initial state. But to this there were a few marked exceptions, as scattered fields, widely apart, were found with "firing" severe on the flax stems. It was obvious that in these particular fields the disease had been present for quite a considerable time. One of the worst cases of "firing" found, was where flax had been sown on a lea field which had been used as a spread-ground for a badly rusted crop in 1944. The attack of the disease, on the whole, was later and flax did not suffer from "firing" to the same degree as in the previous year.

Phoma sp. Next to rust, Phoma was the most widespread and serious disease encountered. The first affected specimens were forwarded on 8th May, and most of the samples submitted for examination showed Phoma severe on the cotyledons. This disease is definitely seed borne, as cytological investigations of diseased flax seed carried out by our colleague Dr. Clinch have shown the development of Phoma pycnidia on seed germinated in a moist dish in the laboratory. All the evidence obtained indicated that the present seed dressings in use did not effect any measure of control whatever on this disease. Attacks of Phoma on flax seedlings can only be diagnosed from those of Seedling Blight by microscopical examination, when numerous pycnidia are seen to be present on affected tissues, including the first pair of seed leaves. Where diseased seedlings came to hand during the month of May, observations made afterwards on affected crops showed that the early attacked plants generally succumbed before reaching a height of 6 inches. On these dead plants the fungus continued fructifying and the disease spread to surrounding plants, girdling of the stem being frequent just above soil level. The result was, that at and immediately following flowering of the host the dead and dying plants stood out in brown patches which were in marked contrast to the normal green of the healthy plants.

In Co. Cork, Phoma was seen in many crops during the June inspection but affected plants did not exceed 2-3 per cent. in the worst fields. Nevertheless, short and all as the time was between the two visits (16 days) it was found that the disease had increased in severity in the meantime, and some crops had developed 10-12 per cent. infection. The intervening period had been very wet and this probably facilitated the spread or the development of the disease.

In the northern counties the variety Liral Monarch suffered worse from Phoma than any other variety, and fields of Liral Monarch were found with 10, 15, 20, 33 and in one case 50 per cent. diseased plants. In several places

Liral Prince or Liral Crown grown in the same fields as Liral Monarch showed only occasional dead stalks, while Liral Monarch was badly attacked. This variety may be more susceptible to Phoma than Liral Prince or Liral Crown, but on the other hand, some fields of Liral Monarch sown with Derbyshire seed had practically no Phoma, and the explanation of so much of the disease in Monarch may have been due to the use of heavily infected seed. Quite a number of the badly diseased crops of Liral Monarch originated from 1943 Kentish seed.

Judging from the Reports of Investigations on Flax Diseases which appeared in this Journal in 1920, 1921 and 1922*, the position with regard to Phoma on flax seems to have altered radically within the last quarter of a century. Several species of Phoma are recorded in literature as attacking flax, but what species is present in Ireland or whether more than one species occurs is not known at present. The virulence of the disease during the last couple of years may be due either to the introduction of new species of Phoma, or to the greater susceptibility of some of the modern flax varieties now in cultivation.

"Pasmo" Disease, *Sphaerella linorum*. This disease, which has spread from South America to many of the flax growing countries of the world, is an entirely new disease in this country. As already mentioned it was first recorded from Ireland by Lafferty and one of us in 1944, having been found in the autumn of that year on a weed, *Linum angustifolium* (*Ibid.*). In that article it was suggested that a careful search in this country would probably show the disease to exist on cultivated flax, and unfortunately this has now been confirmed. However, only two cases of cultivated flax infected with "Pasmo" were discovered in 1945. The first case came to hand in the first week in June, when diseased seedlings were received from Co. Cork. These plants were 2-3 inches high but the attack on them was quite severe. The crop grew out of this seedling attack to a large extent, and although plants with "Pasmo" were found later during field inspection, the disease appeared to be of little consequence in this particular instance. No record of the variety sown was kept and all attempts to procure samples of the seed used ended in failure.

Incidentally it should be stated that the farm where this outbreak of "Pasmo" occurred was situated approximately 85 miles distant, in a straight line, from the farm where diseased plants of *Linum angustifolium* were found in 1944. Moreover, a careful search of the farm and neighbourhood failed to reveal any infected plants of *Linum angustifolium*.

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*G. H. Pethybridge and H. A. Lafferty.—Investigations on Flax Diseases. Journ. Dept. of Agric. and Technical Instruction for Ireland. Vol. XX, pp. 325-342, 1920.

G. H. Pethybridge; H. A. Lafferty and J. G. Rhynehart.—*Ibid.* Vol. XXI, pp. 167-187, 1921 and Vol. XXII, pp. 103-120, 1922.

The second case of "Pasmo" on flax occurred in Co. Kilkenny, an area in which flax is not grown for the production of fibre, the diseased specimens being forwarded by Mr. D. Hurley, Instructor in Agriculture, towards the end of September, 1945. This crop was an oil flax, variety Redwing, grown for feeding purposes. It was raised from seed saved in Co. Kilkenny the previous year. It is interesting, however, to note that the seed which gave rise to the 1944 Kilkenny crop emanated from the Co. Cork farm on which "Pasmo" infected plants of *Linum angustifolium* occurred originally.

The Grey Mould, *Botrytis cinerea.* Attacks of this fungus were quite common in flax fields in 1945, particularly under trees and in similar shady places. This prevalence of Grey Mould was probably due to the continual wet weather experienced throughout June and early July, as all members of this genus thrive in a humid atmosphere. Although common, it was difficult to form any estimation of the economic importance of this disease. The attack on the plants nearly always occurred on the upper part of the stem or on the tops. the latter not infrequently being killed back for a length of 5-6 inches. Infection was usually confined to a group of adjacent plants, but such diseased patches seldom exceeded a square yard in area and few of them occurred in any particular field.

The Stalk Disease, *Sclerotinia sclerotiorum.* This disease may be considered only of negligible importance, but a few cases of it were seen where the fungus was growing vigorously on lodged stalks.

Flax Droop. This obscure malady is characterized first by a down curvature of the tops, and finally by their complete drooping due to the degeneration of the fibres in the upper part of the stems. The disease was first reported and described in this Journal in 1922. It appears, however, to be of rare occurrence, as few references to it are to be found in plant disease literature. The cause of the trouble is not known but no parasitic organism is involved. In both cases referred to in Table I, the diseased plants came from separate farms in Co. Cavan and were received early in August during a spell of very warm weather. One of the fields was reported as showing a fairly high percentage of affected plants scattered here and there through it. Flax had not been grown in this field for the previous twenty years.

Miscellaneous.—Insect pests were not numerous. Flea beetle attacks at one time threatened to become serious but owing to the onset of showery weather plants recovered rapidly and the insect ravages were checked. Capsid injury was only noticed adjacent to fences and was slight. Leather-jacket grubs were responsible for an almost complete failure of the crop in one field in Co. Donegal.

Flax which was being grown in greenhouses at Glasnevin was badly attacked by powdery mildew during the month of September. Morophologically the fungus agreed with descriptions of *Erysiphe polygoni* but no perithecia were found. Evidently under glasshouse conditions flax is subject to powdery mildew. It has been recorded on flax in the glasshouse by Salmon and Ware in 1927*, and by Colhoun and Muskett in 1941†. The latter investigators also report the occurrence of powdery mildew on plots in the field.

In many plants affected with various diseases or checked and injured through any cause, a species of Alternaria commonly occurred. This fungus was apparently only weakly parasitic, following in the track of other organisms or damage.

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†Colhoun J. and A. E. Muskett.—Powdery Mildew, Hail Damage and Heat Canker of Flax. Gardeners' Chronicle, 110, p. 30, 1941.

EAR BLIGHT, CEREAL SCAB AND SEEDLING BLIGHT OF WHEAT.

GIBBERELLA ZEAE (SCHW.) PETCH.

By

ROBERT McKAY, D.Sc.
Professor of Plant Pathology, University College, Dublin.

The three names, Ear Blight*, Scab and Seedling Blight, do not refer to separate or distinct diseases, but are those applied to different phases of attack on the wheat plant by one and the same fungus namely, *Gibberella Zeae* (Schw.) Petch, formerly known as *Gibberella Saubinetii* (Mont.) Sacc.

EAR BLIGHT.

Infection may occur at any time from the emergence of the ears until the wheat is in the stack. The most susceptible time, however, and that during which the greatest harm is done, is from the flowering period until the grain is in the soft dough or "setting" stage. The earliest sign of infection is the appearance of a small brown or water-soaked spot on the outer glume, which soon bleaches, and under favourable climatic conditions the disease spreads to the entire spikelet. Affected areas dry out, take on a ripened appearance, and the diseased spikelets stand out in marked contrast to the healthy green spikelets. The glumes of an infected spikelet often remain closed, being bound together by the growth of the fungus within, and a pinkish growth of the organism may be evident at the base of the glumes. Under moist conditions a complete weft of whitish or pink mycelium may develop over the spikelet, Fig. 1. If the weather is dry a single spikelet only may be diseased and the progress of the disease stopped by lack of moisture, but in wet seasons the disease spreads to spikelets above and below the original point of infection, thus giving rise to a group of diseased spikelets.

Although the head may occasionally be infected throughout, it is more usual for a group of adjacent spikelets to be diseased. Nevertheless, the injury to the whole head is often out of all proportion to the actual number of affected spikelets. This is owing to the fungus invading the central axis of the head at the base of an early infected spikelet, such invasion of the rachis cuts off

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* Other organisms, and especially species of Fusarium occasionally cause similar blighting of wheat ears, but the Fusarium most prevalent on diseased wheat heads in Ireland is *Fusarium graminearum* Schwabe, which is recognized as being the conidial stage of *Gibberella Zeae* (Schw.) Petch.

all water and food supplies to that part of the head above the point of attack. Heads, or portions of heads, which have been killed in this way by early seasonal attacks soon bleach and take on the appearance of premature ripening. Later, towards harvest such heads are darker in colour than healthy ears, due to the growth of saprophytic moulds on them. Moreover, they remain erect when healthy heads are bending down under the weight of ripening grain.

Infection of the ears arises from wind borne spores. Depending upon the time at which infection of the head occurs the following variations may be present:—

(i) Many spikelets may be barren, the remainder enclosing a few shrunken grain;
(ii) grain may be present in all spikelets but shrivelled and showing more or less of a pinkish tinge;
(iii) grain in the lower part of the head may be well developed but that in the top shrunken or absent;
(iv) all grain may be plump and well formed but some of it may show a reddish discoloration at the embryo end.

All shrivelled kernels in infected heads are not necessarily diseased, as this depends on their proximity to the point of infection. On the other hand, normal looking grain taken from diseased ears may be infected although no visible sign of the fungus is present. In severe attacks actual reduction in yield may amount to over 50 per cent., and in addition to this loss much of the remaining grain may be shrivelled and infected, Fig. 9. All degrees of infection of the grains occur, from very slight to complete permeation and destruction of the kernel by the fungus.

A microscopical examination of the reddish growth present between infected spikelets and at the base of the glumes shows it to be made up of a weft of the fungus which is producing numerous sickle shaped spores, Figs. 3 and 4. This is the Fusarium or conidial stage of the fungus, and it is the one most generally seen. The conidia are formed in enormous numbers during humid weather, and they serve for the rapid spread of the disease during the growing season.

Cereal Scab.

Following the Fusarium stage of the fungus, just described, in wet seasons perithecia develop on diseased spikelets, and this gives the ears a scabbed appearance, Fig. 2. This perithecial stage of the disease is totally unlike any other disease on wheat ears in this country. It does not always develop after Ear Blight but it was present on many diseased crops in the years 1942-1945

inclusive. The perithecia appear to the naked eye as small black bodies standing up from the surface of affected parts, Fig. 2. They may be few or so numerous as to form regular incrustations over diseased spikelets. Each perithecium consists of a flask-like structure containing numerous eight spored asci, Figs. 5, 6 and 7. These fructifications are one of the methods by which the fungus overwinters, the ascospores being liberated in spring and giving rise to new infections on suitable hosts. Under natural conditions the perithecia have not been found upon the wheat grain itself but they form freely on diseased stubble as well as on the ears.

The formation of perithecia appears to be mainly dependant upon plenty of moisture, and cases have come to notice where they developed profusely after the wheat was placed in the stack at a point where rain was gaining admittance.

Seedling Blight.

In seasons following wet years when much infected grain occurs, wheat brairds may be poor and thin through low germination of diseased grain. Badly infected grains do not germinate. Others less thoroughly permeated by the fungus produce weak plants which succumb before emergence from the soil, or give rise to plants which are small and chlorotic with poorly developed root systems. Fig. 8. Such roots as are present are generally brown and decayed. Many of these weak plants perish in the seedling stage. However, depending upon the intensity of basal invasion by the fungus and environmental conditions, affected plants may grow out of the disease to some extent, but usually they develop more or less foot-rot, give rise to sterile tillers, are somewhat dwarfed and ripen prematurely. Seedlings which succumb to the disease and also plants which survive early attacks become potential sources of infection for the remainder of the crop. The former produce perithecia on their dead tissues and the latter at the base of the culms of sterile tillers. These perithecia may be mature and liberating ascospores by the time the crop comes into flower.

Toxic Properties of Diseased Grain and General Recommendations.

Besides the actual loss in yield and shrivelling of many kernels, infected grain is toxic to several farm animals. The injurious substances are transmitted to the manufactured product made from such grain, and symptoms of poisoning and intoxication follow the consumption of bread made from diseased wheat. Pigs, horses and man are very susceptible to this toxic substance.

The toxic properties of infected grain may be reduced somewhat by prolonged storage with repeated shovellings or by soaking and washing with water. Grain which is badly infected is not a satisfactory food for pigs, horses

or young chickens. It may, however, when mixed with other grains be fed to cattle, sheep and mature poultry. Wheat from badly infected crops should not be used for seed purposes. To begin with, the germination of such seed is low, and its use not only results in thin brairds but may give rise to Seedling Blight. Diseased seedlings serve as a source of infection to the crop in general, and seed dressings do not control the disease effectively.

All varieties of wheat are susceptible to the disease, and under the farming conditions existing in this country, rotation of crops does not apparently influence the control of the disease. In fact, observations made over a number of years, and which are reported elsewhere*†, show that Ear Blight is very often worse after a root crop than after another cereal crop. This is probably due to the greater susceptibility of the more luxuriant foliage produced after a root crop.

Other Cereals Affected by the Disease.

While wheat has been the cereal most affected by *Gibberella Zeae* in Ireland, attacks also occur on barley, rye and oats. Infection in all cases gives rise to similar symptoms as those produced on wheat. In the case of oats the damage done to the panicle is not so severe as in wheat, barley and rye. The open nature of the oat panicle does not favour invasion of the central axis and hence, individual spikelets on oats are often found with Ear Blight or Scab but the remainder of the panicle develops normally.

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Figs. 1, 6, 7 and 8 are reproduced by courtesy of The Royal Dublin Society.

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*McKay, R.:—On an Epidemic of *Gibberella Saubinetii* (Mont.) Sacc. on Wheat in Éire in 1942. Sci. Proc. Roy. Dublin Soc., Vol. 23, No. 11, pp. 111-129, 1943.

†McKay, R. and J. B. Loughnane :—Observations on *Gibberella Saubinetii* (Mont.) Sacc. on Cereals in Ireland in 1943 and 1944. *Ibid.*, Vol. 24, No. 2, pp. 9-18, 1945.

Fig I

Wheat head, showing Ear Blight with weft of mycelium and diseased spikelets due to *Gibberella Zeæ*.

Fig 2

Severe attack of Scab on wheat head. Note, narrow "waisted" appearance of head indicating early infection. Grain in such heads badly developed and shrivelled.

Figs. 3-7. Photomicrographs of fruitifications of *Gibberella Zeæ.*

Fig. 3. Mass of Fusarium spores obtained from spikelets affected with Ear Blight. x 60.

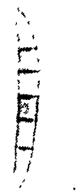


Fig. 4. Single conidium. x 500.

Fig. 5. Section through two perithecia showing general structure. x 80.

Fig. 6. Mature ascospores in ascus. x 750.

Fig. 7. General appearance of ascospore when removed from the ascus. x 1000.

Fig. 8 Seedling Blight, slight to severe, the result of sowing grain infected with *Gibberella Zeæ*

Fig. 9. Wheat grains from diseased ears on left, healthy grains on right.

RAPE GROWING IN IRELAND.

Including Record of Trials Conducted at the Department's Farms.

Before the introduction of mineral oils colza oil was an important commodity for both lighting and lubrication and historical records indicate that rape for the production of oil was cultivated to a considerable extent in this country in earlier times.

Young, in his "Tour of Ireland" records that Mr. Stephen Moore of Marlfield, Clonmel, had a rape-mill for making oil, and that all the seed was raised in the neighbourhood. On the occasion of his visit to County Clare (Dromoland ---seat of Lucius O'Brien) Young found rape being grown there, and he mentions that some of the crop of seed was pressed into oil at the mills of Scariff and Six-Mile-Bridge, but that most of it was sold to Limerick merchants who exported it to Holland. In the "Statistical Survey for County Clare" published in 1808 the following references to rape-seed production are found:-

> "The rape-mill at Scariff is conducted by James Flannery. I was informed he could procure as much seed as he could manufacture."
> "In the barony of Tullagh many advances towards improvement have been made by small farmers propagating rape."

Wakefield, in his "Account of Ireland, Statistical and Political" published in 1811 states that rape was cultivated for seed in King's and Queen's Counties, and parts of Tipperary. William Tighe, in the "Statistical Survey of County Kilkenny" published in 1802 records that an area of 60 acres of rape was grown for seed in County Kilkenny, and that there were two rape-mills in Iverk.

Exports of Rape-seed:

It is clear from figures compiled by Wakefield from the Inspector-General's returns that there was a substantial export trade in rape-seed, and rape-seed products, (*viz.*, rape-oil and rape-cake), from 1771 to 1811. In the year 1807 the value of our exports of rape-seed and its products amounted to £58,171. For the ten-year period ended 1811 there was an average annual export of 6,796 quarters of rape-seed valued at £10,231, together with rape-seed products valued at £16,381. Thus, in times when our total export trade was only a fraction of what it is to-day (probably about £5,000,000) rape-seed was by no means a negligible item.

METHODS OF CULTIVATION.

In the "Statistical Survey of County Kilkenny" the following passage occurs:—

"Rape or cole-wort is not a general article of culture; it is usually sown in bog or wet ground, drained and burnt for the purpose of being reclaimed, and sometimes in good land; the ashes are ploughed in before the seed is sown, which is generally covered with a light harrow; some drive sheep over the field instead of harrowing and some sow it under the plough; it is cut in the end of July or in August and sometimes lies a day or two on the ledge; when a field of any size is to be saved it is usual for the neighbours to assist that it may be done in one day, which becomes a kind of holiday, the farmer supplying entertainment and a piper; another day is occupied in threshing the whole upon the ground. Produce of rape-seed—10 to 12 barrels per acre. The stalks are generally burnt and the ashes sold to chandlers."

In another part of the same work farmers are recommended to sow rape-seed at the rate of 8 lbs. per acre about the 10th July; to graze sheep on it, keeping them off at night, from October to March; and to keep up the crop afterwards for seed.

In the "Statistical Survey of County Clare" (1808) Mr. Hely Dutton makes the following observations:—

"From some experiments I have tried, I know that those plants whose heads are cut off are less liable to mildew than when left on ——— When it is intended to use rape for both purposes it should be sown earlier than is commonly practised. The end of June or the beginning of July would not be too soon. Too much seed is always used and the plants never thinned, which causes the seed to be small and less productive than if left thinner; if they were thinned to 9 or 10 inches asunder much more and better seed would be produced; when it is used for food it should be cut previous to the 1st of March as cutting after that period would very much injure it for seed and too much of the head should not be cut off. If it could be accomplished the best method is to transplant it into drills about 30 inches wide."

In North Tipperary the method of harvesting appears to have been to cut the rape when ripe with the reaping-hook, to bind it into sheaves and then to cart it into the haggard. It was threshed by getting it on to winnowing sheets and beating it with long sticks. In later times, the seed was generally put through the winnowing-machine before it was marketed. Before the rape was carted to the haggard there was always a considerable loss of seed through shedding and growers were usually satisfied if their losses in this way did not exceed half the crop.

YIELDS AND PRICES:

In the "Statistical Survey of County Kilkenny" yields of 10 to 12 barrels per acre are mentioned. It is not very clear what the weight of the barrel of rape-seed was in County Kilkenny. Mr. Hely Dutton indicates that the barrel of rape-seed in County Clare weighed 16 stones but adds "sometimes the buyer wrangles more out of the farmer." If it is assumed that the barrel weighed 16 stones in County Kilkenny and that the yield was 10 to 12 barrels per Irish acre (the Irish acre appears to have been in general use there in those times), this would be the equivalent of 12½ to 15 cwts. per statute acre.

The price of rape-seed appears to have fluctuated widely from time to time. A price of £1 3s. 0d. per barrel is mentioned for 1789. Rape-seed exported from Waterford in 1811 realised 50/- per barrel, according to Wakefield. Because of the changes in the value of money it is, of course, very difficult to accurately compare price levels at different times. It is fairly clear, however, that the price of rape-seed when it was produced in this country was far higher than the prices of foreign rape-seed in recent years.

While petroleum or crude hydrocarbon oil had been used since time immemorial as a luminant it was only after the introduction of the process devised in 1850 by Dr. James Young for the production by distillation of paraffin oil or kerosene (thereby producing a luminant free from the objectionable fumes of crude petroleum) that the use of this type of oil for illumination became general. From that time onward, however, its use spread rapidly and it soon replaced colza oil except for church and other sacred purposes. As the demand for this oil fell off the cultivation of rape in this country decreased so that, except for small trial plots during the 1914-18 war periods, little or no rape for the production of oil was grown in the country since 1860.

When the necessity arose after the outbreak of war in 1939 for the home production of oil-bearing seeds, it was considered that rape might be one of the crops most likely to give desirable results. Little reliable information, however, in regard to its cultivation and cropping potential were available and in order to obtain information on these it was decided to lay down small trial plots at the Department's farms.

Accordingly, in July, 1940, a small plot was sown at each of the three schools, Athenry, Ballyhaise and Clonakilty, on lea land which had been ploughed the previous spring or autumn. Particulars regarding dates of sowing and reaping, rate of seeding, manuring and yield are shown in Table 1 for each centre.

TABLE 1

CENTRE	Area of Plot	Date of Sowing	Rate of Seeding per acre	Manure Applied per acre	Date of Harvesting	Yield per acre
Athenry ..	.32 acre	1/7/40	12 lb.	15 tons dung 3½ cwt. mixed fertiliser	28/6/41	10 cwt.
Ballyhaise ..	62 acre	12/6/40	8 lb.	No manure	25/7/41 26/7/41	16¼* „
Clonakilty ..	.25 acre	10/7/40	8 lb.	No manure	9/7/41	17½ „

*Part of plot destroyed by pigeons in spring not included.

Germination and establishment of the crops on all plots was satisfactory. At Clonakilty the crop was grazed with sheep in September and October but not at the other centres. At Athenry cutting was done with the mowing machine and at Ballyhaise and Clonakilty with reaping hooks. After cutting, the sheaves were stooked for one to two weeks, carted and threshed by hand and cleaned by winnowers.

At Ballyhaise pigeons destroyed part of the crop by devouring the leaves during January, 1941, and at Athenry considerable damage was done by small birds when the crop was ripening.

Samples of the seed produced when tested for oil content were found to contain from 35% to 42% oil.

A further plot was laid down at each of the three schools in 1941. Particulars of area, dates of sowing and harvesting, rate of seeding, manures applied and yield are contained in Table II.

TABLE II

CENTRE	Area of Plot	Date of Sowing	Rate of Seeding per acre	Manure Applied per acre	Date of Harvesting	Yield per acre
Athenry ..	.33 acre	23/5/41	12 lb.	15 tons dung 5 cwt. Semsol 1 „ Sulphate Ammonia	2/7/42	69 lb.
Ballyhaise ..	.50 „	13/8/41	8 lb.	-----	11/7/42	9¼ cwt.
Clonakilty ..	.25 „	17/7/41	10 lb.	Superphosphate and Sulphate Ammonia	30/6/42	16½ „

At Athenry the soil was light limestone in barley stubble. The seed was sown under perfect weather and soil conditions and germination was good. Subsequently, growth was slow and the seedlings became stunted and even in the spring of 1942 the crop was only about a foot high. During the winter and spring it was severely damaged by pigeons and hares. During ripening, sparrows and linnets destroyed more than half the crop.

At Ballyhaise birds also attacked the ripening crop and broke down many of the plants, causing the loss of a big proportion of the seed.

At Clonakilty the crop progressed fairly well from the time it was sown but was not considered sufficiently strong to permit of grazing in autumn as had been done the previous year.

Samples of the seed produced were tested for oil with the following results:—

Athenry	..	..	..	39.0% oil
Ballyhaise	..	..	..	38.7% ,,
Clonakilty	..	..	..	38.5% ,,

In 1942 plots were again laid down as in the past two seasons. Particulars regarding area, dates of sowing and harvesting, rates of seeding, manuring and yield are set out in Table III.

TABLE III

Centre	Area of Plot	Date of Sowing	Rate of Seeding per acre	Manure Applied per acre	Date of Harvesting	Yield per acre
Athenry ..	.44 acre	27/5/42	12 lb.	None	26/6/43	11 sts.
Ballyhaise ..	.5 ,,	31/8/42	8 lb.	None	26-30 July	4½ cwt.
Clonakilty ..	.5 ,,	10/7/42	10 lb.	12 tons dung	5-9 July	15½ ,,

At Athenry the soil was rich limestone on which sheep had been fattened for a number of years and was in consequence in excellent heart. Germination and growth during the summer and autumn were good. In the spring of 1943 the crop became patchy and developed an unhealthy appearance and by flowering time was only 18 to 21 inches high. During ripening it was severely attacked by birds.

At Ballyhaise the crop grew very satisfactorily and promised to give a heavy yield of grain but was attacked by sparrows and pigeons during ripening and the greater part destroyed.

At Clonakilty growth was vigorous from the start and the crop did not suffer damage from pests. As in the previous year, the crop was not grazed in autumn.

Samples of the seed produced tested for oil gave the following results:—

Athenry	28%	oil
Ballyhaise	37.9%	,,
Clonakilty	33%	,,

In 1948 a further plot was sown at the Ballyhaise centre only. As in the previous years, the crop grew satisfactorily but during ripening was again almost entirely ruined by sparrows and pigeons. The yield of seed was at the rate of 3½ cwt. per acre.

While it is tradition that rape is particularly suited to peaty soils it is also known to succeed well on good alluvial or clay loams. The fact that at Athenry the crop was not more than moderately successful though grown on good, deep, alluvial soil which had been well manured but which is rich in lime (P.H. 7 or over) together with the fact that comparatively good crops were produced at Ballyhaise and Clonakilty where the land though not so heavily manured is low in lime suggests that rape may not be tolerant of high lime content in the soil. At Ballyhaise the depredations of birds particularly wood pigeons which abound in the surrounding woodlands, constituted the main difficulty to the successful cultivation of the crop.

TRIALS IN THE CULTIVATION OF BIRD-SEEDS AT THE DEPARTMENT'S FARMS.

Because of the scarcity of birdseed resulting from emergency conditions small scale trials were carried out at the Department's farms and at the Cereal Station, Ballinacurra during the years 1942, 1943 and 1944, to ascertain whether the usual constituents of the more popular birdseed mixtures (canary grass, hemp and rubsen rape seeds) could be grown in this country. Rubsen rape is an annual variety of the Brassica Rapa species. Some crops were partly destroyed by attacks of insect pests in the early stages, or the seeds when ripening were eaten by birds with consequent reduction in yields. The yields obtained in those cases where undue damage was not experienced indicate the range of yields which may be expected under field conditions.

The canary grass, hemp, and rubsen rape seeds in the first year were supplied by the City of Dublin Cage Birds' Association. Subsequently the crops were grown from the seed produced on the farms except in the case of hemp. The hemp seed used in the second year trials was of Turkish origin and was kindly supplied by Messrs. Irish Ropes, Ltd.

ATHENRY CENTRE, 1942.

Hemp.—The seed was sown on clean soil following a manured crop of potatoes. No manure was applied to the hemp crop. Germination was poor, and plant establishment very low, but a few plants eventually established themselves. These grew slowly at first but after a time growth became more rapid and by the end of August large bushy plants, up to three feet high, were produced. Flowering, however, was late and no seeds set.

Canary Grass.—The canary grass was sown on soil in good heart, the previous crop being potatoes to which dung had been applied. No manures were applied to the canary grass. Sowings were made on the 21st April, 29th April and 7th May. Germination was good. The seedlings established themselves rapidly and continued to make steady growth throughout the season. The three plots flowered about the same time and were harvested on the 2nd September. After remaining in stooks for some time the crop was stored on a well lighted and well ventilated loft. Threshing was carried out on the 16th October, the yield being at the rate of 5 cwts. per statute acre.

Rubsen Rape.—Three sowings were made at intervals in soil which had received a dressing of farmyard manure in early spring.

The first sowing was made on the 29th April. Germination was very poor and an early attack by the Turnip Flea Beetle (Phyllotreta nemorum) caused considerable damage to an already poor stand. The crop from this sowing was a partial failure.

A further plot was sown on the 2nd June. Germination was again poor and a patchy braird resulted, the plants being small and sickly, attaining a maximum height of only six inches. The crops from these two sowings were harvested on the 24th and 28th August respectively and on threshing yielded only 2 ozs. for 630 square links equivalent to 20 lbs. approximately per statute acre.

A third sowing was made on July 24th. Germination was somewhat better in this case than with the earlier sowings, but plant establishment was poor. The crop was in flower on the 19th October but failed to set seed subsequently.

1943.

Hemp.—The soil on which this trial was carried out was of a stony limestone nature, the previous crop being winter wheat. The plot received a dressing at the rate of 15 tons of farmyard manure per statute acre in March. On one half of the plot the seed was sown in rows $2\frac{1}{2}$ feet apart, the plants being subsequently thinned to 15 inches apart in the rows. On the other half the seed was sown broadcast, raked and finally rolled in. Both sowings were made on the 6th May.

On the row-sown plot the crop was a failure—only three female plants grew. Where the seed was sown broadcast, however, germination and plant establishment were good, and vigorous, healthy seedlings produced. Growth was unchecked during the season and a promising crop resulted. The plants around the edges of the plot attained a greater height and showed more vigour than those within the plot. The male plants flowered earlier than the female.

The crop was harvested on the 14th September. The heavy rains which occurred during late August and September adversely affected ripening. Threshing was carried out a fortnight later, the yield being 5 cwts. per statute acre for the broadcast plot.

Rubsen Rape.—The seed was sown on the 27th April in soil which had received a heavy dressing of farmyard manure during the previous winter.

Germination was good but the seedlings were attacked by the Turnip Flea Beetle a few days after they emerged above ground. This attack, however, was controlled by dusting the plants at weekly intervals with an in-

secticide. Growth was slow during the early part of the season but during the summer the plants grew satisfactorily, reaching a height of 6 to 8 inches at flowering time. The crop was harvested on the 1st September and yielded 1 lb. 10 ozs. of good seed from a plot of 289 sq. links—equivalent to 5 cwts. per statute acre.

Canary Grass.—The type of soil, its treatment and preparation were similar to that for the hemp.

The plot was divided into three sub-plots. The seed was sown in rows 15 inches apart, each sub-plot being sown on a different date. Germination and plant growth in all cases were satisfactory, a full and even braird being established in about a fortnight from date of sowing. Sub-plot A was attacked by hares and before protection could be provided, considerable damage was caused, which adversely affected the subsequent yield. The following Table gives particulars of dates of sowing, flowering, harvesting and yield for each of the sub-plots:

Sub. Plot	Date of Sowing	Date of Flowering	Date Harvested	Yield of Plot	Area	Yield per Statute Acre
A	26 April	26 June	25th August	8 lb.	1872 sq. links	3¾ cwts.
B	10 May	5 July	4th Sept.	12½ lb.	1472 sq. links	7½ ,,
C	20 May	10 July	14th Sept.	8½ lb.	800 sq. links	9½ ,,

1944.

Hemp.—The seed was sown on a light limestone loam which had produced a good crop of roots the previous season. Sowing was done by hand on the 15th May, half of the plot being sown in rows 2½ feet apart and half broadcast.

The seed sown in rows germinated satisfactorily producing healthy vigorous plants. By the end of July they had reached a height of about 3½ to 4½ feet.

In the plot sown broadcast the plants on the outside were much more vigorous than those on the inside, the former being 2½-3 feet in height.

Bad weather conditions at time of ripening delayed harvesting and considerable loss of seed due to shedding occurred. Sparrows did considerable damage to the crop during ripening.

The plots were harvested on the 2nd October and yielded 32 lb. of seed corresponding to about 6½ cwt. per statute acre. The seed was of good quality.

Canary Grass.—The seed was sown on the 22nd May in rows 15 inches apart on a plot adjacent to the hemp. It germinated well, produced a vigorous braird and by mid-July had reached a height of 2 to 2½ feet. Flowering took place about the 12th July. The crop was fully ripe on the 30th September. It was cut with a mower with reaping attachment, tied in sheaves and treated like an ordinary corn crop. Threshing was carried out with the farm thresher, the yield of good quality seed being at the rate of 12¼ cwts. per acre.

BALLYHAISE CENTRE, 1943.

Hemp.—A plot of hemp seed was sown, on well-manured ground on the 22nd April, but only a small number of seeds germinated. The plants were very weak and though well cultivated started to die off, and by the end of June all plants were dead.

Rubsen Rape.—A small plot of rubsen rape was sown on the 22nd April. It germinated poorly, producing weak plants many of which died off after brairding. Most of the remaining plants died off in May and June. The few plants that survived did not flower.

Canary Grass.—A small plot of canary grass seed was sown on the 30th April on dry lea which had been ploughed the previous Winter.

The seeds germinated well and produced a good even braird which grew well during the summer. The crop was even but did not ripen until early October.

The weather during harvesting was so bad that it was found necessary to take in the produce immediately after cutting and store it on a well-lighted and well-ventilated loft.

Threshing was done by hand, the yield being at the rate of 9¼ cwts. per statute acre. All the seed was of good quality.

1944.

Canary Grass.—A small plot was sown on the 28th April. The seed germinated and produced a good braird and the crop grew well throughout the season reaching a height of 2½ to 3 feet. Though the crop grew vigorously none of the seed ripened.

Sunflower.—A plot of sunflower seed was sown at this centre on 28th April, 1944. The seed germinated well and while strong plants varying in height from 3 to 6 feet were produced, no seed developed.

CLONAKILTY CENTRE, 1942.

Hemp.—The hemp seed supplied germinated very poorly. Only two plants grew and no seed was produced.

Rubsen Rape.—Sowings were made in rows 8 inches apart on 10th April, 26th May and 14th July. The plants produced were small—the height varying from 9 to 15 inches. All three sowings flowered and produced seed. In the case of the sowing made on the 14th July the yield and quality of the seed were poor.

Canary Grass.—Sowings were made in rows 15 inches apart on April 10th, April 20th and May 6th. Germination was fairly satisfactory. The first sowing kept ahead of the later ones and gave the highest yield.

The first sowing was harvested on the 24th, the second on the 29th August and the third on the 9th September, the quality of the seed produced in all cases being good. Deseeding was done by hand, the estimated yields per statute acre from the different sowings being 19 cwts., 15¾ cwts. and 13½ cwts. respectively.

1943.

Hemp.—The plot received a dressing of farmyard manure together with an application of a compound artificial manure. The previous crop was lea oats. On one half of the plot the seed was broadcast and on the other sown in rows 2½ feet apart, the plants being thinned to a distance of 15 inches apart in the rows. Both sowings were made on the 6th May.

Germination and subsequent plant establishment were slow, but eventually a fairly even braird was produced. During June and July growth was rapid, the plants on the drilled part of the plot being much stronger and taller than those on the broadcast area.

The crop was harvested on 15th September—the rate of yield of seed per statute acre being 5½ cwt. on the plot which was sown broadcast and 4¾ cwts. on the other plot. The seed was of fairly good quality.

Rubsen Rape.—Three sowings were made. The turnip flea beetle destroyed the first two, and the crop from the third sowing was very poor. The total amount of seed produced from 2.62 square perches was only ¼ lb.

Canary Grass.—Three plots of equal size were laid down on lea ground ploughed early the previous winter. Sowings were made on the 31st March,

14th April and 5th May. All sowings germinated well, but the plants on the plot sown on the 31st March remained stunted for a long period due to the severe weather after sowing. They were also attacked by wireworms.

The seed sown on the 14th April brairded the most evenly, grew best and looked the most promising of the three during the growing season.

The crops from the three sowings were harvested on 14th and 29th September and 15th October and yielded 107 lb., 137 lb and 61 lb. per statute acre respectively. All crops were rather severely attacked by Fusarium avenaceum which was responsible for the low yields.

1944.

Hemp.—A small plot of hemp seed was sown broadcast on 25th May on a soil in a good state of fertility, after a crop of potatoes.

It germinated rapidly and produced a vigorous healthy crop. Considerable damage to the ripening seed was caused by birds and very little was harvested.

Canary Grass.—A small plot of canary grass seed was sown on the 14th April in rows 15 inches apart on stubble ground into which a dressing of farm-yard manure had been ploughed the previous winter. The crop yielded 116 lb. of reasonably good seed per statute acre.

CEREAL STATION, BALLINACURRA, 1943.

Hemp.—The seed was sown on 30th April, half in drills 27 inches apart and half broadcast on soil which had received a liberal dressing of farm-yard manure. Plant establishment was very poor, probably not more than 10 per cent.

On the drilled area where it was possible to keep the plants free from weeds subsequent growth was satisfactory but at thinning, due to the poor stand it was not possible to have the plants as close as had been desired.

Due to the development of about 50 per cent. male plants on the drilled area and to considerable losses in the female plants during the season the final stand of female plants was sparse. These latter grew to 5 feet in height and produced good bushy heads. When threshed the yield was at the rate of 275 lb. per statute acre.

On the broadcast area there was approximately one female plant per square foot but due to the inability of the broadcast hemp to compete with the weeds the plants remained stunted and when threshed yielded at the rate of only 92 lb. per statute acre.

MUNSTER INSTITUTE, 1943.

Hemp.—A plot of hemp was sown at the Munster Institute on the 15th May. On half of the area the seed was sown in rows 2½ feet apart, and on the other half was broadcast.

Germination was so poor on the drilled area that about 30 per cent. of the final stand of plants was transplants from the broadcast sown plot.

On the drilled area the plants produced were up to 4 feet high with good branching heads. The plants on the broadcast area were stunted and produced seed on the tips of the main stems only.

The entire crop ripened unevenly and was difficult to save. The thick heads held the moisture during the harvest and the ripe seeds began to sprout, consequently the crop had to be harvested before being fully ripe.

The drilled area produced twice as much seed as the broadcast area.

SUMMARY.

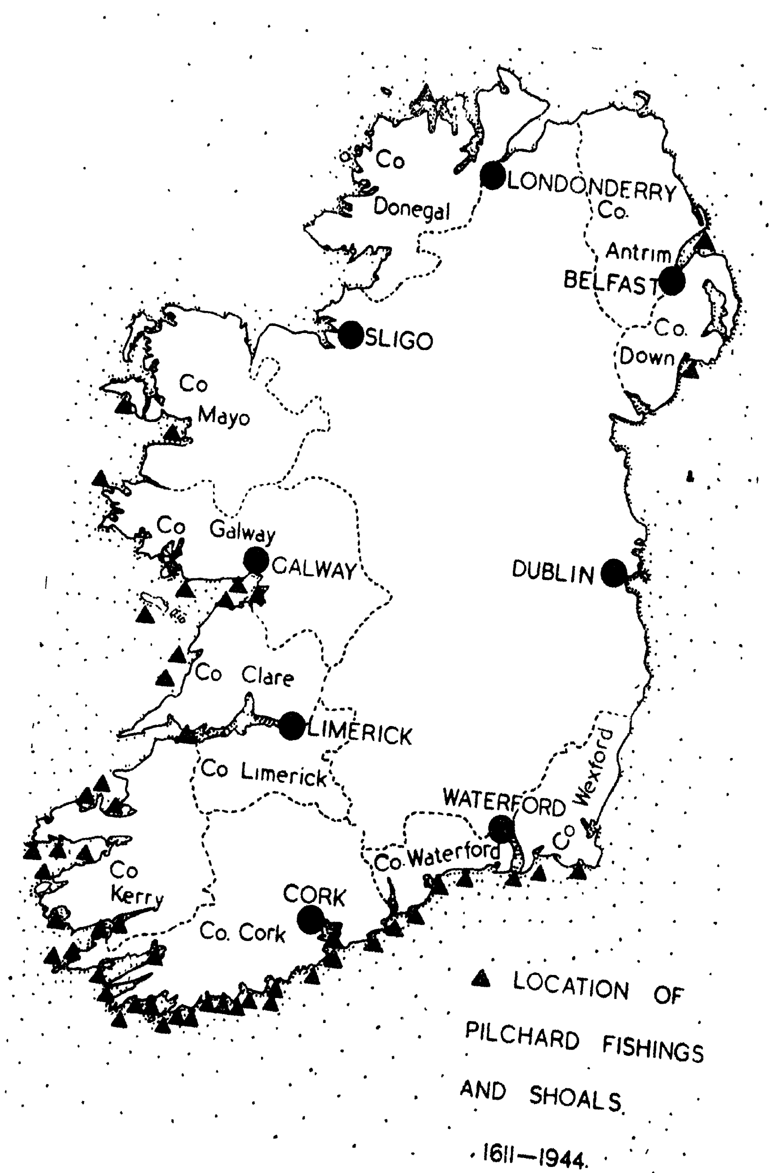
Trials in the cultivation of hemp, canary grass and rubsen rape seeds, all of which are usual components of bird seed mixtures, were laid down at the Department's Farms at Athenry and Clonakilty in 1942. Similar trials were continued in 1943 and 1944 at these farms and also at Ballyhaise. Trials in the cultivation of hemp seed were also carried out at the Munster Institute and at the Cereal Station, Ballinacurra, in 1943.

In 1942 the hemp seed sown at both Athenry and Clonakilty germinated poorly and produced only a few plants, which failed to set any seeds. This failure may have been due to the poor quality of the seed available for the experiment.

Further trials with a different variety in 1943 and 1944 were more successful and yields of up to 6½ cwt. per acre were produced. Drilling in rows about 2½ feet apart proved to be a more satisfactory method of cultivation than broadcasting. The crop proved difficult to harvest in broken weather owing to the tendency of the head to hold moisture which resulted in the grains sprouting. The ripening crop was severely attacked by birds.

Altogether eight trials were conducted in the cultivation of canary grass. One of the crops failed while yields in the other cases varied from ½ cwt. to 19 cwt. per acre. Drilling in rows 15 inches apart proved a more satisfactory method of cultivation than broadcasting. Good crops were produced by sowing as early as 10th April in Clonakilty and as late as 20th May in Athenry. One crop was severely damaged by Fusarium Avenaceum and another by hares. No other pests of importance were noted.

Of the five trials conducted with rubsen rape no seed was produced in two cases. In the other three cases the yields varied from a few pounds up to 5 cwt. per acre. The turnip flea beetle damaged all the crops severely.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LOCATION OF
PILCHARD FISHINGS
AND SHOALS.
1611—1944.

THE IRISH PILCHARD FISHERY, THE POSSIBILITY OF REVIVAL

By

ARTHUR E. J. WENT, Inspector of Fisheries.

A profitable fishery for pilchards off the West coast of England but mainly off the coast of Cornwall subsisted for many centuries and Howard Fox in his paper "Observations in further illustration of the history and statistics on the Pilchard Fishery" in the *Report of the Royal Cornwall Polytechnic Society for the year* 1878 gives an interesting and informative account of this fishery down the centuries as shown by records from State and other historical papers relating to Great Britain and Ireland. This species of fish is known as the sardine on the Atlantic coasts of France, Portugal and Spain. Few people realise that the pilchard also frequents Irish waters where at certain periods in history pilchard fishing was intense and profitable. Throughout the State and other historical papers relating to Ireland there are many references to the pilchard fishery in Irish waters from the beginning of the 17th century but even before that time the pilchard was apparently an important item of Irish commerce. A. K. Longfield in her book *Anglo-Irish Trade in the Sixteenth Century*, 1929, remarks that cured pilchards were exported from Ireland and P. H. Hore in his *History of the Town and County of Wexford, Old and New Ross*, 1900, refers to pilchard fishing off the south coast of Ireland in the year 1591.

The history of the Irish Pilchard fishery can be followed in detail back to the year 1611 from the State Papers and other historical records (See Arthur E. J. Went, "The Irish Pilchard Fishery," *Proceedings of the Royal Irish Academy*, 51. C. No. 4, 1946).

Apart from being interesting from the historical viewpoint, these provide material on which to estimate the prospects for a successful revival of the Irish Pilchard Fishery in the twentieth century. It is unnecessary in this short account of the commercial possibilities of Irish pilchards to give full details of the history of the fishery since the year 1611.

It is sufficient to say that in the period 1611 to 1689 there was a flourishing pilchard fishery at many places along the south coast of Ireland but from 1690 for a period of some 40 years the pilchard more or less deserted Irish shores. For a few years in the thirties and forties of the eighteenth century the pilchard returned to our coasts and then virtually disappeared again until the

years 1823 and 1824, when there were large shoals in places as widely separated as Bantry and Clew Bays. From 1825 pilchards again deserted the Irish coast for a few years, reappearing in the years 1833 to 1836. From 1837 to 1869, save for isolated localities, pilchards were either absent or scarce along most of the south coast of Ireland. A re-appearance in quantity was observed in 1870, the numbers increasing up to the year 1875 and then decreasing until 1882 after which they virtually disappeared, save for a few stragglers until about 1935. In 1935 pilchards again appeared in small numbers, the size and extent of distribution of the shoals increasing until about 1943, after which there was a tendency for the numbers to decrease.

That the shoals of pilchards along the Irish coasts show considerable fluctuations is, however, obvious. In some years the shoals of fish were sufficiently large and numerous to support an intensive fishery, whereas in others they were small and scarce, being virtually absent. The distribution of the pilchard around the coasts of Ireland is varied. During the period 1611 to 1944 pilchards have been observed or captured along the coast from Wexford to Mayo and off Counties Donegal and Down (see Fig. 1) but they are normally in greatest strength between Wexford and Galway. One year, however, they will appear in strength in one part of the south coast of Ireland and in another elsewhere along the coast. The pilchard fishery has already been recognised, even in Cornwall, as one which shows extreme fluctuations.

From the foregoing it is obvious that since the year 1690 or thereabouts fishing for pilchards in Ireland has been very uncertain owing to the great fluctuations in the size of the shoals. What, might be asked, are the prospects of reviving a successful pilchard fishery in Ireland in the 20th century ? The fact that there is no appreciable demand for the fresh fish in Ireland (the Irish Sea Fisheries Association attempted without success to market the fish during the herring shortage in 1942) makes it necessary to look to other methods of disposal of the produce of the fishery. Three obvious methods would seem to present themselves, namely, (*a*) the curing of the fish for an export market, (*b*) canning for the home and possibly for an export market and (*c*) the use of the fish for the extraction of the oil and conversion of the residue into poultry food or manure.

Some years ago there was a profitable market for cured pilchards in Italy but the profitable export for this market was entirely dependent on the prevailing economic conditions. The outbreak of hostilities in 1936 between Italy and Abyssinia was, in fact, the virtual end of the Cornish pilchard fishery, although a very marked decline had set in many years before.

Canning of pilchards would provide the country with a source of good food but the canneries would have to be close to the ports of landing to enable operations to commence before the rapid decomposition, characteristic of this

fish, had commenced. A suitable site or a number of sites would have to be selected for this purpose. Even if pilchards do approach the Irish coasts there is no method of determining where they will be in the greatest numbers. Both curing and canning necessitate the making of prior arrangements for the treatment of the fish, which obviously cannot be transported long distance before they are processed.

The immediate processing of the fish is not quite so necessary where oil and poultry food or manure are the ultimate objects of the fishery but prior arrangements must be made for processing.

Apart from these difficulties associated with the treatment of the fish after capture there is another and even greater difficulty in the fluctuations in the size and number of the shoals of pilchards around the coast. From the history of the pilchard fishery over the past two and a half centuries, it would appear to be inadvisable for this country to attempt, on a large scale, to revive a pilchard fishery, either as a basis for cured fish for export, canned fish for the home or export market or as a source of fish oil, and either poultry food, or manure. Something might be done, by arrangement with the various canning firms or manufacturers of poultry food, etc., to take any fish captured by drift nets, when herrings were being sought, for manufacturing purposes but this appears to be as much as can be done at present towards exploiting any pilchard shoals which may frequent the coasts in future years. Small quantities of pilchards might be sold for kippering when herrings are scarce, but the quantities which can be disposed of in this way are very limited, and certainly not worth the establishment of a definite fishery. When pilchard shoals come in-shore sufficient are usually taken by herring drift nets to satisfy any demand for kippering.

STUDIES ON TOMATO NUTRITION II.

The Effect of Varying Concentrations of Potassium on The Growth and Yields of Tomato Plants

By

EDWARD CLARKE, B.Agr.Sc. (Hort.), Ph.D.

In part 1 of these studies (8) recommendations were made as to the quantitative nature of the basal and top dressings of potassium sulphate likely to produce most satisfactory results as regards growth, vigour and cropping of tomato plants. Regarding the frequency of top dressing it was suggested that the number of applications during the growing season might, with advantage, be limited to two or perhaps three, since the more frequent use of even the light ⅛-oz. dressing had a retarding effect on the rate of ripening and led to a depression in yield of ripe fruit, although giving the highest total yield. In view of the fact that it is not uncommon in commercial practice to give up to six dressings of potassium during the growing season, many of which may be of a heavy nature, it was decided to carry out further experiments to ascertain the number of applications likely to give economic returns.

Experimental.

In 1943 an experiment was devised involving twenty-one treatments with four plants to each treatment. The same basal dressings of potassium sulphate were used as in the 1942 trial, but only the ⅛-oz. top dressing which was proved to be the most satisfactory was employed this time, and was given once, twice, three times, etc., up to the maximum number, which was six separate ⅛-oz. dressings during the season. The dressings therefore were as follows :—

Basal	0, ½, 1 oz. per plant.
Top dressings ..	0, ⅛-oz. per plant per application.

Subsequently throughout the text basal dressings will frequently be designated B, and top dressings T, with the appropriate amount of potassium sulphate added as a suffix thus : B_1 ; $B_{\frac{1}{2}}$; $T_{\frac{1}{8}}$; or $B_{\frac{1}{2}}$ $T_{\frac{3}{8}}$. In the last example $B_{\frac{1}{2}}$ indicates that the basal dressing of potassium sulphate was half an ounce, and $T_{\frac{3}{8}}$ signifies three separate top dressings of one-eighth of an ounce each, and should not be construed as a single three-eighth-ounce application.

Top dressing commenced at the setting of the second truss and was repeated according to the series at fourteen day intervals. The variety was again Potentate, the growing medium was similar to that used in the 1942 experiment (*i.e.*, a fibrous acid peat very low in potassium and in other nutrients, including magnesium) and the general procedure was the same as then. The plants, graded for uniformity, were transferred to their final ten-inch earthenware pots complete with drainage tins, and were placed in their fruiting quarters on May 19th. The experiment was terminated on November 18th.

Owing to the great number of treatments involved and the limited space available, replication was not possible, and furthermore the number of plants per treatment had to be reduced. In the strict sense, therefore, the results do not permit of statistical analysis but, nevertheless, it is perfectly clear that certain definite and similar trends existed in all of the principal phases studied. In assessing the value of the data presented two important points which lend weight to the deductions should be borne in mind, namely, an almost complete absence of disease among the plants, and the fact that the findings have been substantiated in a later experiment carried out on a larger scale and with replicated treatments. A general summary of the results is presented in Table 1. (Note 1 oz. per plant of potassium sulphate = 1,000 lb. per acre for a 16,000 per acre planting of tomatoes).

Table 1

Summary of results from the different potassium treatments.

(Yields given in ounces).

Plant Nos.	Potassium Treatments	Total Potassium Sulphate applied (oz.)	Ripe Fruit No.	Ripe Fruit Wt.	Green Fruit No.	Green Fruit Wt.	Total Fruits	Total Wt. (oz.)	Percentage Fruit Ripened	Weight of Ripe Fruit as Percentage of Max. Ripe Fruit ($B_1 T_{\frac{2}{8}}$ = 100)
1–4	$B_0 T_0$	0	109	138	0	0	109	138	100	46
21–24	$B_0 T_{\frac{1}{8}}$	$\frac{1}{8}$	118	180	17	9	135	189	95	59
25–28	$B_0 T_{\frac{2}{8}}$	$\frac{1}{4}$	139	229	29	22	168	251	91	76
17–20	$B_0 T_{\frac{3}{8}}$	$\frac{3}{8}$	152	239	15	11	167	250	96	79
9–12	$B_0 T_{\frac{4}{8}}$	$\frac{1}{2}$	171	254	20	13	191	267	95	84
13–16	$B_0 T_{\frac{5}{8}}$	$\frac{5}{8}$	148	243	25	19	173	262	93	80
5–8	$B_0 T_{\frac{6}{8}}$	$\frac{3}{4}$	163	246	30	32	193	278	89	81
33–36	$B_{\frac{1}{2}} T_0$	$\frac{1}{2}$	143	230	17	13	160	243	95	76
37–40	$B_{\frac{1}{2}} T_{\frac{1}{8}}$	$\frac{5}{8}$	136	231	32	29	168	260	89	76
45–48	$B_{\frac{1}{2}} T_{\frac{2}{8}}$	$\frac{3}{4}$	153	251	17	19	170	270	90	83
49–52	$B_{\frac{1}{2}} T_{\frac{3}{8}}$	$\frac{7}{8}$	142	214	27	18	169	232	92	71
29–32	$B_{\frac{1}{2}} T_{\frac{4}{8}}$	1	165	273	37	32	202	305	90	90
53–56	$B_{\frac{1}{2}} T_{\frac{5}{8}}$	$1\frac{1}{8}$	151	270	24	20	175	290	90	89
41–44	$B_{\frac{1}{2}} T_{\frac{6}{8}}$	$1\frac{1}{4}$	153	250	33	27	186	277	90	83
81–84	$B_1 T_0$	1	137	250	38	37	175	287	87	83
77–80	$B_1 T_{\frac{1}{8}}$	$1\frac{1}{8}$	148	244	23	17	171	261	94	81
65–68	$B_1 T_{\frac{2}{8}}$	$1\frac{1}{4}$	164	308	25	25	189	328	92	100
61–64	$B_1 T_{\frac{3}{8}}$	$1\frac{3}{8}$	117	202	33	22	150	224	90	67
57–60	$B_1 T_{\frac{4}{8}}$	$1\frac{1}{2}$	151	263	27	25	178	288	91	87
73–76	$B_1 T_{\frac{5}{8}}$	$1\frac{5}{8}$	144	217	31	39	175	256	85	72
69–72	$B_1 T_{\frac{6}{8}}$	$1\frac{3}{4}$	150	261	37	39	187	300	87	86

For convenience the results will be discussed briefly under the following main headings :—

1. Rate of growth and development of plants.
2. Numbers of fruit.
3. Size of fruit.
4. Yields.
5. Other features (chlorosis, 'green-back')

Growth and development.

Owing to unfavourable weather conditions in the early weeks the growth rate was slow but uniform in all treatments. As the season advanced and growing conditions improved all except the no-potassium series reacted favourably, but there was in general a more marked response to top dressings in the B_0 series than in those treatments which received basal potassium. This response was even more accentuated within the B_0 treatments as clearly shown in Table 2, the rate of growth being on a higher plane throughout the season in those series receiving four, five, and six top dressings respectively. In fact the growth rate in the latter treatments was in general much greater than in any other treatments in the experiment, but since the yields from these series, viz. B_0T_4, B_0T_5, and B_0T_6 were very considerably lower than the maximum, both, so far as ripe fruit and total fruit yields are concerned, it follows that the extra growth stimulated by repeated light top dressings of potassium to some extent merely represented a dissipation of this nutrient. As against this, the evidence presented in Table 2, taken in conjunction with yield data, suggests that when no basal potassium is supplied at least three, or perhaps four dressings might be given to meet growth needs and at the same time obtain but a moderate yield return, but without basal potassium, either being already present in the soil or growing medium, or supplied in some suitable form before planting, really satisfactory growth and cropping cannot be obtained.

Least extension growth response during the season was obtained from the 1-oz. basal series while the reaction of the $B\frac{1}{2}$ treatments to top dressings of potassium was in general intermediate. Within both the latter serial groups there was little differential reaction to the various top dressings, and in fact there was slight if any additional growth where the number of applications exceeded two. The fact that the rate of extension growth was in general lowest in the B_1 series and that the highest yields were obtained from certain of those treatments provides further support for the findings in the earlier studies namely, that for a growing medium as used here which is low in potassium, best results will be obtained by giving a heavy basal dressing (1,000 lb. per acre of potassium sulphate) followed by light top dressing, $\frac{1}{8}$-oz. per plant, or 125 lb. per acre. It is very evident that the more balanced, sturdier, and most fruitful type of growth followed this procedure. It is worthy

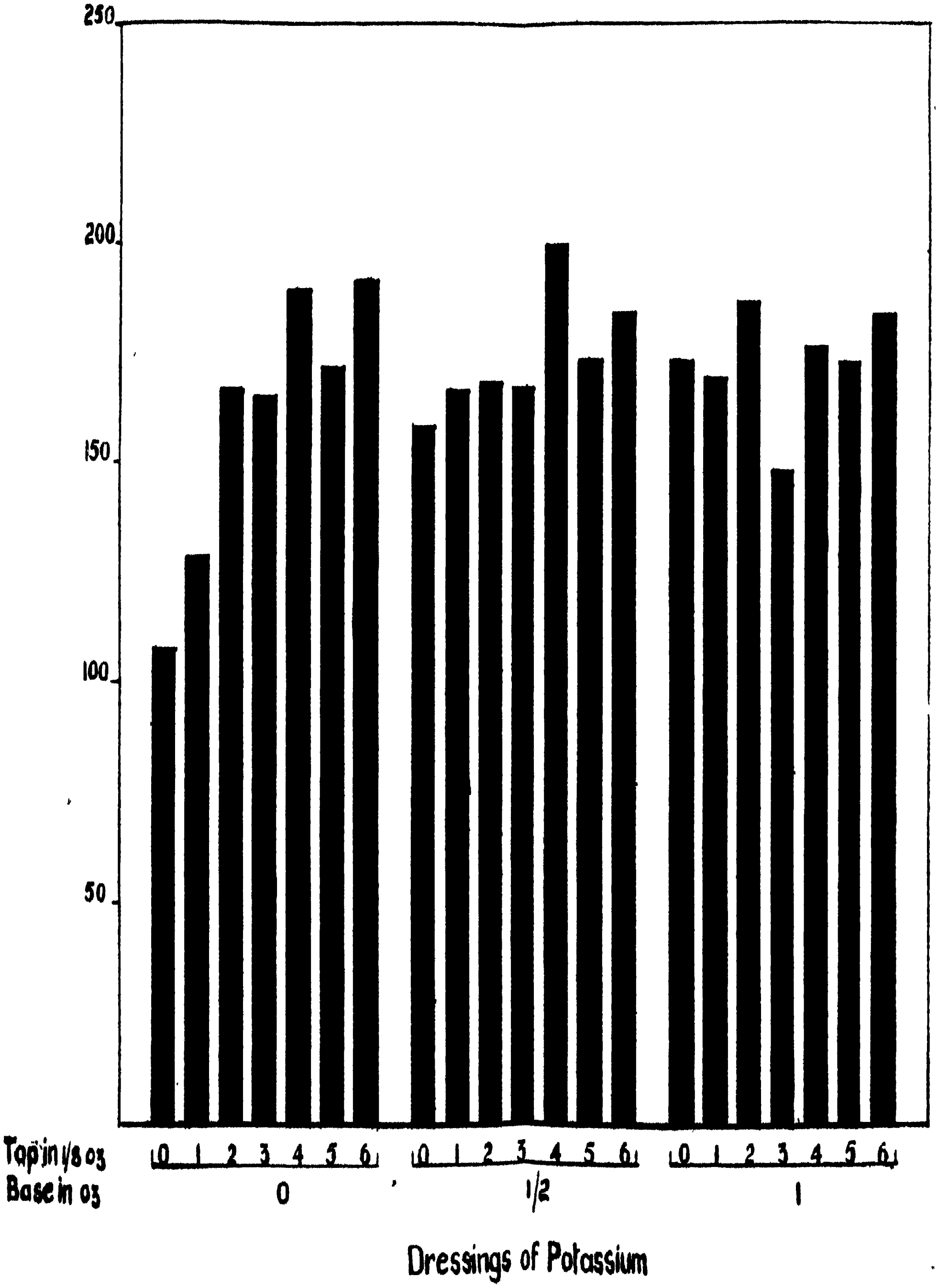
of note that in the B_1 series any additional growth resulting from giving more than two top dressings was not accompanied by a proportional increase in yield, but frequently the reverse, which points to a waste of potassium, apart altogether from the possibility of such practice bringing about certain undesirable features associated with an excess of potassium either within the plant or in the growing medium. The same growth reaction was noted in the $B\frac{1}{2}$ treatments when the number of top dressings exceeded four. It appears, therefore, that when no potassium or small amounts only are given in the base, the effect of light $\frac{1}{8}$-oz. dressings up to four in number, may be to stimulate growth frequently at the expense of yield, while it would seem such light top dressings following a satisfactory basal dressing can have a steadying influence on growth and lead to increased yields. The number of applications likely to yield economic returns appears to be two.

TABLE 2.

Average heights (cms.) at regular intervals with average increases between successive recordings.

Plant Nos.	Potassium Treatments	9–9–43	19–7–43	Increase 9–7–43 to 19–7–43	30–7–43	Increase 19–7–43 to 30–7–43	10–8–43	Increase 30–7–43 to 10–8–43	21–8–43	Increase 10–8–43 to 21–8–43	1–9–43	Increase 21–8–43 to 1–9–43	12–9–43	Increase 1–9–43 to 12–9–43
1–4	$B_0 T_0$	58.25	71.50	13.25	91.75	20.25	105.00	13.25	112.50	7.50	114.75	2.25	117.75	3.00
21–4	$B_0 T_{\frac{1}{8}}$	59.50	74.00	14.50	94.50	20.50	111.75	17.25	116.00	5.25	118.50	2.50	121.50	3.00
25–8	$B_0 T_{\frac{2}{8}}$	66.00	83.25	17.25	108.25	25.00	128.00	19.75	138.00	10.00	143.25	5.25	147.50	4.25
17–20	$B_0 T_{\frac{3}{8}}$	59.25	78.00	18.75	105.00	27.00	129.00	24.00	138.25	9.25	141.25	3.00	145.00	3.75
9–12	$B_0 T_{\frac{4}{8}}$	65.25	83.00	17.75	106.25	23.25	125.75	19.50	138.00	13.25	146.75	8.75	157.50	10.75
13–16	$B_0 T_{\frac{5}{8}}$	59.25	78.25	19.00	104.00	25.75	129.25	25.25	148.75	19.50	159.50	10.75	174.00	14.50
5–8	$B_0 T_{\frac{6}{8}}$	60.75	78.00	17.25	100.00	22.00	119.75	19.75	132.25	12.50	141.25	9.00	154.75	13.50
33–36	$B_{\frac{1}{2}} T_0$	67.00	86.00	19.00	109.50	23.50	128.25	18.75	135.00	6.75	139.75	4.75	147.50	7.75
37–40	$B_{\frac{1}{2}} T_{\frac{1}{8}}$	66.50	86.00	19.50	110.00	25.00	130.75	19.75	141.25	10.50	151.75	10.50	156.25	4.75
45–48	$B_{\frac{1}{2}} T_{\frac{2}{8}}$	61.75	79.00	17.25	104.25	25.25	125.25	21.00	140.00	14.75	148.75	8.75	158.00	9.25
49–52	$B_{\frac{1}{2}} T_{\frac{3}{8}}$	58.00	73.75	15.75	96.50	22.75	114.75	18.25	127.00	12.25	132.50	5.50	142.00	9.50
29–32	$B_{\frac{1}{2}} T_{\frac{4}{8}}$	60.00	77.00	17.00	101.25	24.25	119.25	18.00	133.00	13.75	140.75	7.75	149.00	8.25
53–56	$B_{\frac{1}{2}} T_{\frac{5}{8}}$	58.50	75.50	17.50	100.75	25.75	121.25	20.50	135.50	14.25	144.75	9.25	154.25	9.50
41–44	$B_{\frac{1}{2}} T_{\frac{6}{8}}$	59.25	76.25	17.00	98.50	22.25	118.75	20.25	128.25	9.50	136.75	8.50	144.75	8.00
81–84	$B_1 T_0$	49.00	61.00	12.00	83.50	22.50	105.00	21.50	119.25	14.25	128.00	9.25	133.25	5.25
77–80	$B_1 T_{\frac{1}{8}}$	55.00	71.25	16.25	92.25	21.00	112.50	20.25	124.75	12.25	130.75	6.00	137.50	6.75
65–68	$B_1 T_{\frac{2}{8}}$	58.50	74.00	15.50	99.25	25.25	117.25	18.00	130.25	13.00	136.25	6.00	143.25	7.00
61–64	$B_1 T_{\frac{3}{8}}$	51.80	67.75	15.95	89.00	22.25	112.25	23.25	127.00	14.75	134.25	7.25	143.00	8.75
57–60	$B_1 T_{\frac{4}{8}}$	59.00	74.25	15.25	99.75	25.50	118.75	19.00	135.00	16.25	143.75	8.75	151.25	7.50
73–76	$B_1 T_{\frac{5}{8}}$	61.00	76.25	15.25	99.50	23.25	113.75	14.25	122.75	9.00	130.50	7.75	140.25	9.75
69–72	$B_1 T_{\frac{6}{8}}$	57.25	74.50	17.25	93.50	19.00	113.00	19.50	127.50	14.50	135.75	8.25	146.25	10.50

Fig I Showing Numbers of Fruit



Numbers of Fruit.

With the possible exceptions of the B_0 T_0 and B_0 $T_{\frac{1}{8}}$ treatments there was little fluctuation in the total numbers of fruits from the different treatments (see Table 1 and Fig. 1). As in the previous experiments there was an increase in the numbers of fruit in direct proportion to the amount of basal potassium supplied. The effect of top dressing was not very marked except, perhaps, in the B_0 series where the increase in fruit numbers was more or less in proportion to the number of top dressings given. The further increase beyond that got from four applications cannot be entertained, and any additional increase obtained by giving more than two top dressings cannot be regarded as of importance. At the intermediate level of basal potassium there was a response from up to four top dressings, though the increment beyond that derived from two applications was not great. With the 1-oz. basal treatments best results were obtained by giving only two top dressings of potassium. The maximum number of fruits was not derived from this treatment, however, but from the $B_{\frac{1}{2}}$ T_4 treatment.

Size of Fruit.

The size of fruit increased in direct proportion to the amount of potassium given in the base. For any level of basal potassium there was no further increase of any consequence in size of fruit when the number of top dressings exceeded two. The largest fruits in the experiment were, as shown by Tables 3a and 3b, obtained from the B_1 T_2 treatments, but despite this there was least response to top dressings in the B_1 series. In fact in the 1-oz. basal treatments the size of fruit decreased as the amount of potassium given increased, especially when the number of top dressings was greater than two. This decrease in fruit size with increased concentrations of potassium beyond a certain level agrees with the earlier findings of the author (3) and also with those of Wall (10), while Selman (9) working with the same variety as in this case, and studying the effect of lime and potash on mosaic infection, also found "that the average weight of fruits was reduced by increasing the potassium level." In Selman's work it may be stated that the total amount of potassium supplied even at the low level of this nutrient, was far in excess of the maximum given in any of these series of experiments. The evidence here goes to show that, provided a satisfactory base dressing of potassium is given, there is nothing to be gained by applying more than two light top dressings, and in view of the experience gained to date, the practice, so common in commercial concerns, of applying heavy top dressings either as a means of steadying growth, or to counteract virus disease, does not seem reasonable and can only produce results inimical to satisfactory growth, vigour and cropping. With reference to the virus mosaic, other findings in Selman's recent work (9) are noteworthy namely "it is concluded that with the variety Potentate, potash manuring should be carefully controlled if immunity from accidental infection to mosaic is to be maintained" and "it is suggested that the hardening or

growth check commonly associated with potash applications in commercial tomato culture tended to increase the susceptibility of the plants to accidental infection of mosaic."

TABLE 3a

Average Size of Ripe Fruit (oz.)

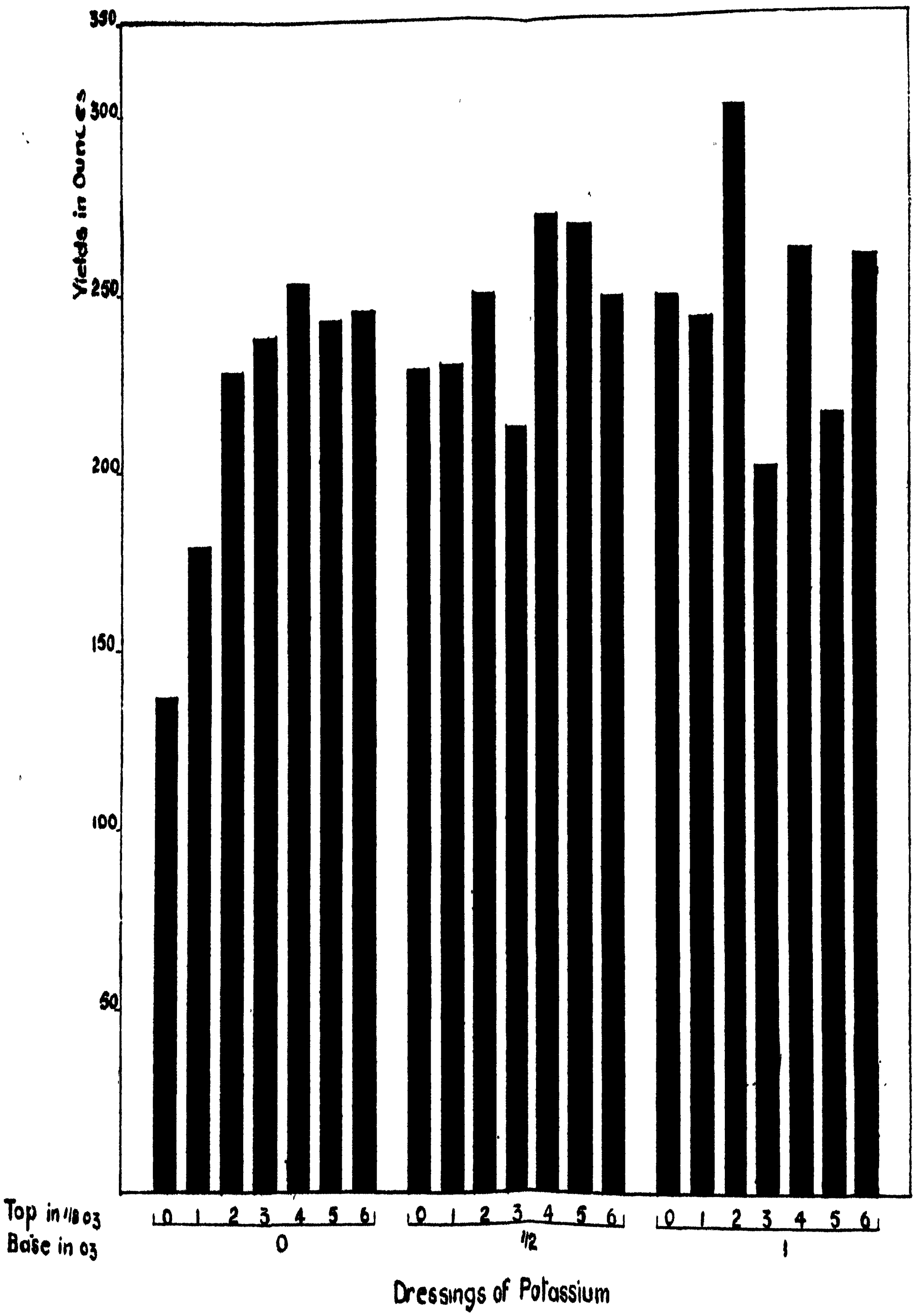
	T_0	$T_{1/8}$	$T_{2/8}$	$T_{3/8}$	$T_{4/8}$	$T_{5/8}$	$T_{6/8}$
B_0	1.27	1.53	1.62	1.57	1.49	1.64	1.51
$B_{1/2}$	1.61	1.70	1.64	1.51	1.65	1.79	1.63
B_1	1.83	1.65	1.85	1.73	1.74	1.51	1.74

TABLE 3b

Average Size of Combined Ripe and Green Fruit (oz.)

	T_0	$T_{1/8}$	$T_{2/8}$	$T_{3/8}$	$T_{4/8}$	$T_{5/8}$	$T_{6/8}$
B	1.27	1.40	1.48	1.50	1.40	1.51	1.44
$B_{1/2}$	1.52	1.55	1.59	1.37	1.51	1.66	1.49
B_1	1.70	1.53	1.74	1.49	1.67	1.42	1.60

Fig II Showing Ripe Fruit Yields



YIELDS AND RATE OF RIPENING

Total Yields of Ripe Fruit.

Reference to Table 4 and Fig. 2 shows that the yield was directly proportional to the quantity of potassium given by way of base dressing, best results having been got by the heavy 1-oz. dressing. This confirms the findings of the earlier experiments and again clearly emphasises the importance of giving adequate potassium before planting. Where no basal potassium was given and where the dressing was a half ounce only (*i.e.*, roughly equivalent to 500 lb. per acre of potassium sulphate) there was in general a progressive increase in yields from top dressings up to four in number, but beyond that there was a depression. The highest yields obtained from any of those series were very considerably lower than the highest yield of ripe fruit which was recorded from the B_1 T_2 treatment. At the high (1 oz.) level of basal potassium there was a distinct response from two light top dressings, the yield of ripe fruit having been markedly greater than from the B_1 T_0 treatment, which incidentally produced the greatest quantity of ripe fruit in the 1942 experiment. When, however, more than two top dressings were applied there was a sharp falling off in ripe fruit returns, indicating that when the basal dressing of potassium is adjusted to the proper level (having taken into account the amount of this nutrient present in an available form in the growing medium at planting time) there is nothing to be gained, but possibly much to be lost, by repeating even light top dressings more than twice. This becomes all the more apparent by referring to Figs. 1 and 2 which show the variations in the numbers and weights of fruits respectively from the different treatments. It will be seen that while the numbers of fruit obtained from the two treatments B_1 T_2 and B_1 T_6 were almost identical the yield of ripe fruit from the former was very much in excess of that from the latter. Actually the difference was 14 per cent. in favour of the B_1 T_2 treatment, and a difference of this magnitude cannot be lightly overlooked, either from the scientific or purely commercial aspect.

The data here presented afford confirmation of the postulation made when discussing the 1942 findings namely, "had the number of top dressings been perhaps two, instead of six as given here, the results would probably be very different." Furthermore they help to explain why in the 1942 experiment there was a retardation in the rate of ripening in those high-yielding series which were given 1-oz. base followed by six separate ⅛-oz. top dressings of potassium sulphate during the growing season. Since the repetition of even light top dressings can have adverse effects on the total yields of ripe fruit, and on the rate of ripening as shown by reference to treatments B_1 T_2, B_1 T_5 and B_1 T_6 (Table 1) even after allowance is made for any differences in the numbers of fruit between those series, how much more adverse must be the effect of the heavy top dressings commonly given in commercial practice.

Final Total Yields.

As shown in Table 4b, the highest final total yields were got from the B_1 $T_{\frac{2}{8}}$ treatment, which also gave the best results as regards ripe fruit. In the B_0 serial groups the total yield increased more or less in proportion to

TABLE 4a

Total Yields (oz.) of Ripe Fruit

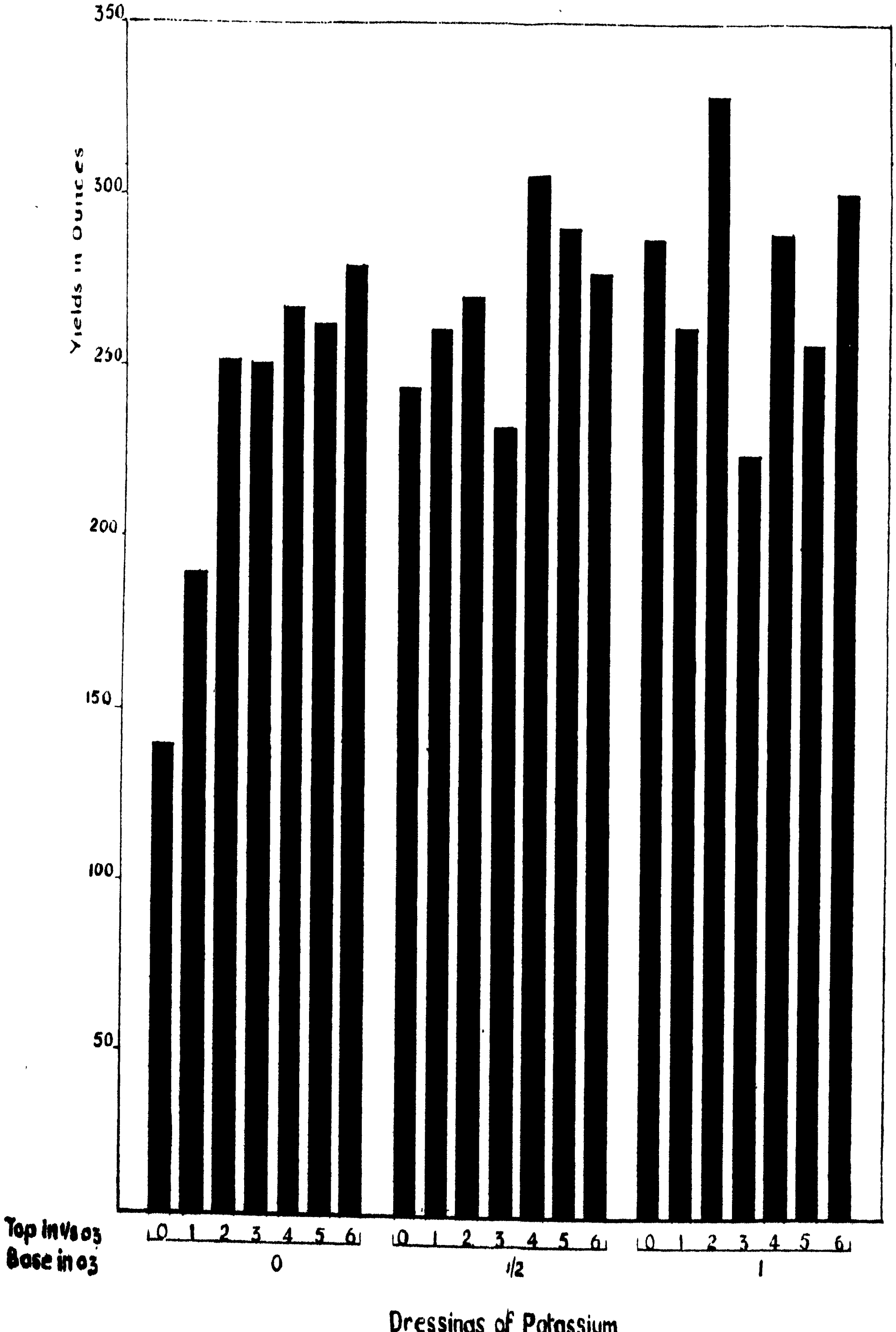
	T_0	$T_{\frac{1}{8}}$	$T_{\frac{2}{8}}$	$T_{\frac{3}{8}}$	$T_{\frac{4}{8}}$	$T_{\frac{5}{8}}$	$T_{\frac{6}{8}}$
B_0	138	180	229	239	254	243	246
$B_{\frac{1}{2}}$	230	231	251	214	273	270	250
B_1	250	244	303	202	263	217	261

TABLE 4b

Final Total Yields (oz.)

	T_0	$T_{\frac{1}{8}}$	$T_{\frac{2}{8}}$	$T_{\frac{3}{8}}$	$T_{\frac{4}{8}}$	$T_{\frac{5}{8}}$	$T_{\frac{6}{8}}$
B_0	138	189	251	250	267	262	279
$B_{\frac{1}{2}}$	243	260	270	232	305	290	277
B_1	287	261	328	224	288	256	300

Fig III Showing Total Fruit Yields



the number of top dressings given, but the further increment in yield beyond that produced by two applications was not of any magnitude. The great benefits accruing from top dressings only are clearly shown in Figs. 1 and 3 but nevertheless, the data presented only serve to emphasise the fundamental importance of giving a proper basal dressing of potassium. At the intermediate level of basal potassium, top dressings up to four in number gave positive results, but beyond that there was a depression. From the final yields point of view Table 4b, it might appear that the $B_{\frac{1}{2}}$ $T_{\frac{4}{8}}$ treatment was a most satisfactory one, but the high yield recorded was not a reflection of well-developed fruit, rather was it the result of a greater number of fruits having developed in that particular series than in any other treatment. The average size of the fruits, and the yield of ripe fruit was much lower than obtained in the B_1 $T_{\frac{2}{8}}$ treatment. At the 1-oz. level of basal potassium there was a depression in total yield when more than two top dressings were given, showing here also the futility of regular applications of this nutrient during the growing season as a means of increasing yields.

GENERAL REVIEW OF GROWTH AND CROPPING RESPONSE.

The writer has been fortunate in having contacts with commercial tomato growing concerns where in the past. potassium sulphate was used in great quantities year after year, both prior to planting and during the growing season, while in most cases great and unknown amounts of potassium were annually applied by way of farmyard manure. In those establishments, yields were in general well below average, due mainly to undersized fruit which ripened slowly and oftentimes unevenly, green-back having been common; while the foliage on the lower and upper-middle portion of the plants invariably became chlorotic quite early in the season (this chlorosis will be referred to later in the text). Analyses which were carried out revealed an extra-high potassium content both in the soil and in the plant tissues. Certain of those growers who were induced to drop potassium almost completely for a few years in succession, found that, not only were the yields stepped up considerably, but the chlorotic condition of the foliage appeared later in the season, and became progressively less severe each year until finally it was eliminated completely or was of negligible consequence. Similar and corroborative results were obtained at the University Farm Institute, Glasnevin where, despite the fact that potassium has been deliberately withheld altogether, or given in very small quantities only during the past four seasons, including 1945, the crop returns have been on a higher plane than previously, while chlorosis which was extremely severe in 1941 became less intense each year and was, for practical purposes, non-existent in the 1945 crop. It is of particular interest to note that the soil in the tomato houses at Glasnevin and also in those commercial concerns just referred to, still contains abundant reserves of available potassium after carrying a number of crops. Also worthy of note is the fact that prior to this 'trial' period of no-potassium, the manurial programme with regard to this nutrient was in accordance with recognised principles of tomato culture.

When, in light of experience to date, it is pointed out to growers that part of their troubles at least might be due to over-manuring with potassium, a common rejoinder is that the soil had been replaced to a depth of six or nine inches for the particular crop in question, so there could be not be any excess of nutrient salts. Frequently, however, the seat of trouble is not in the soil but in the sub-soil, and it is not fully appreciated that much of the nutrients in, or applied to the surface find their way to the lower levels through repeated waterings and tend to accumulate there. In a recent publication by Walsh and Clarke (12) it was shown that in certain tomato house soils which were regularly treated with potassium, according to recognised standards, not only was there an excess of potassium in the surface layers, but even at a depth of three feet there was a concentration the equivalent of two tons per acre of potassium sulphate. Under such conditions the replacement of nine inches of top soil could do little to improve matters, as the roots of the plants would quickly penetrate to the unfavourable environment of the lower layers. Apart altogether from this, the newly introduced soil is as a rule thoroughly mixed with the sub-soil in the course of the deep cultivation done preparatory to planting. Potassium is not easily lost from the soil under ordinary conditions, and much less easily under the artificial conditions of the glasshouse, and if maximum benefit is to be derived from this nutrient, the amounts given and the number of applications must be regulated. This is all the more necessary since potassium is so mobile within the plant, and particularly since tomato plants will absorb it in quantities out of all proportion to their needs, frequently to the exclusion of other vital nutrients such as magnesium.

Reviewing the reaction of the various treatments to growth, vigour, size of fruit, and yields, the evidence goes to show that best results were obtained where a heavy (1-oz.) basal dressing of potassium sulphate was followed by two light top dressings at the rate of ⅛-oz. per plant, or 125 lbs. per acre. Further work, with replicated treatments the results of which it is hoped to publish shortly, afford additional support for these findings, and the question of when to commence top dressing, and the interval between repeat dressings will also be discussed. It is possible, however, that when dealing with a very vigorous variety, or during a prolonged period of dull weather, or when manuring in the season after steam sterilization of the soil, that an additional top dressing might be called for. In regard to manuring after steaming the amounts of potassium sulphate recommended by Bewley (1) as a means of steadying growth *viz.* 10-20 cwts. per acre, seem rather high. Under certain conditions at least, such dressings must surely bring about an unbalanced condition in the soil, for most soils which have been growing tomatoes for a number of years (fertilised as per general recommendations) have as a rule a large accumulated reserve of potassium, and since according to Lawrence (7) *et al.* the actual process of steaming enriches the soil in respect of potassium, to further augment the supply by an extra-heavy dressing cannot make for the best results. At Glasnevin where we knew the soil to be rich in potas-

sium, our basal dressing after steaming some four years ago was 2½ cwts. per acre and we gave no top dressing of this nutrient nor have we given any potassic fertilisers since then except that by way of two light top dressings of potassium sulphate, at the rate of 150 lb. per acre. In other instances potassium-rich soils received neither basal nor top dressings of potassium after steaming, and in all such cases magnificent crops were obtained. Balanced growth was achieved by careful watering, and by extra care in regulating temperature and ventilation, especially until the bottom trusses had set.

OTHER FEATURES STUDIED.

Chlorosis due to Magnesium Deficiency.

In the 1941 and 1942 experiments a chlorosis of the foliage was recorded at the higher levels of potassium nutrition, and 'green-back' of the fruits was noted as a feature of the fruits of the high-potassium treatments. The more recent work of Walsh and Clarke (8, 9) has shown this chlorosis to be due to a deficiency of magnesium within the plant, the result in most cases of depressed uptake of the latter by potassium. In 1943 and 1944 Hewitt (4, 5) recorded 'green-back' as a characteristic of magnesium and/or iron deficiency, so it is quite possible that the 'green-back' of the fruit of the high-potassium series in the earlier (1941 and 1942) experiments was in reality an expression of magnesium deficiency. Certain analyses which had been carried out revealed no differences between the magnesium content of fruit from chlorotic and healthy plants although wide differences occurred in the foliage of such opposite types. It should, however, be stated that in those analyses 'green-backed' as against normal fruits were not specifically selected, but this aspect is receiving attention at present.

In the experiment under review chlorosis due to magnesium deficiency did occur, but was negligible by comparison with that in the earlier experiments, where greater quantities of potassium were used ; while 'green-back' was not very obvious. It is worthy of note that chlorosis was in general confined to those series which received four, five, and six top dressings respectively, and was almost completely absent from treatments given no top dressing, or only one or two applications of potassium. Chlorosis was most severe in treatment $B_1 T_6$ but the fact that it was also relatively severe in treatments $B_0 T_5$ and $B_0 T_6$ goes to show that the frequent use of even light top dressings can seriously interfere with the uptake of that very essential element magnesium, especially in a soil or growing medium like the one here used, which contained little of the latter nutrient. This fact in itself makes a strong case against the use of heavy top dressings of potassium, and more particularly against their frequent application. In view of this antagonistic relationship between potassium and magnesium, it is surprising to see such heavy dressings of potassium sulphate recommended in ordinary commercial practice and especially after steaming, and it is not unreasonable to assume that some of the yellowing of tomato leaves referred to by Bewley (2) as occurring in various places in

England, following repeated steaming, may be due to magnesium deficiency, induced directly by the extra heavy dressings of potassium generally given after such treatment.

Elsewhere (8) it was clearly shown that the wider the potassium-magnesium ratio in the growing medium, the greater the tendency for the development of chlorosis, and that it was the relative, rather than the actual amounts of these nutrients present in the foliage which determined the onset or severity of chlorosis. In all cases of magnesium deficiency studied in Irish tomato houses, the trouble was induced, the plants being starved of magnesium in the presence of plenty, due to the depressed uptake of this nutrient by potassium. Analyses showed the soils to contain extra high potassium, the recording for magnesium being medium, but in some soils where the plants exhibited definite deficiency symptoms there was high magnesium. Jones *et al* (6) report control by soil applications of from 6-10 cwts. per acre of magnesium sulphate (30 per cent. MgO) given as a base dressing, but record similar or even more effective control by spraying (3 or 4 times) with a $2\frac{1}{2}$ per cent. solution of the above compound, using $1\frac{1}{2}$ cwts. per acre.

To get lasting results, however, the cause would need to be eliminated, and it appears to be of first importance to ascertain whether the trouble is induced by the excess use of potassium, or is due primarily to a deficiency of magnesium in the soil, and to modify treatment accordingly. This might involve the use of magnesium sulphate either in spray or solid form or possibly in both forms, but when applied to soils rich in potassium, or when given in conjunction with heavy dressings of the latter nutrient, magnesium sulphate cannot be expected to produce satisfactory results. If chlorosis due to magnesium deficiency in the plant tissues is to be successfully prevented or countered, a balance between potassium and magnesium in the soil or growing medium should be maintained, and towards this end considerable modifications would be necessary in regard to present-day recommendations and usage of potassic fertilisers. In many instances the effective and lasting control lies more in the non-application for some time at least, or in the regulated use of potassic fertilisers, than in the application of magnesium to the soil.

Chlorosis Due to Iron Deficiency.

This condition elsewhere described (12, 13) developed in the topmost leaves during the season and the trouble was speedily and effectively countered in the foliage by spraying the affected parts with a .25 per cent. aqueous solution of ferrous sulphate. Such spraying would need to be repeated at about fourteen-day intervals, and if there is a likelihood of the trouble occurring it is most important to anticipate it by early spraying. The experience to date shows that iron chlorosis generally appears when the plants are swelling some fruits on the third or fourth truss, so it would be advisable to spray at an earlier stage of development. Spraying is preferable to surface application in soils rich in calcium and phosphate, as these elements can render the iron

unavailable. In some of our more recent experiments severe 'green-back' of fruits occurred in association with iron chlorosis of the foliage, and this aspect will receive attention when the results are persented in the near future. Bewley (2) referring to a mottle of the tops of Potentate which he says appears at the setting of the third truss and is believed to be due to manganese poisoning because the soil did not contain enough iron, recommends the early use of dried blood to counter this trouble. He also suggests top dressing with sulphate of iron ¼-oz. per square yard. It must be stated that in these experiments the regular application of dried blood as obtainable in this country had no beneficial effect so far as iron deficiency is concerned, as it contains practically no available iron. In other countries it appears to be common practice for manufacturers to add iron to dried blood, and so it is possible that the beneficial response obtained from applications of this manure (as referred to by Bewley) may to a certain extent at least be attributable to its iron content.

While some cases of iron deficiency in glasshouse tomatoes have been noted in this country, information is wanting as to whether it constitutes a serious problem. Recently, Pizer (8) has reported a severe iron deficiency in tomatoes under glass in Kent, England, which was probably caused by excess lime. He suggests top dressing with peat containing iron salts, as a safe and practical remedy. In view of the antagonistic relationship known to exist between calcium and iron, tomato growers would be advised to use lime with a little more caution and only when necessary, rather than applying it as a routine matter.

CONCLUSIONS.

1. To derive maximum benefit from top dressing, in respect of growth, vigour, and cropping of tomato plants, an adequate supply of available potassium should be present, or should be applied as a basal dressing before planting.

2. In a soil or growing medium which is low in potassium the most appropriate basal dressing appears to be 1-oz. per plant, or 1,000 lb. per acre of potassium sulphate, and if possible, the basal dressing might always be gauged so that the amount of available potassium in the soil at the start of the growing season might approximate to that supplied by this optimum dressing.

3. When a satisfactory basal dressing is provided, or where a sufficiency of this vital nutrient is already present in the soil at planting time, it would seem that optimum results accrue from two light top dressings at the rate of ⅛-oz. per plant, or 125 lb. per acre.

4. The more frequent use of even this light top dressing led in general to depressed yields, smaller fruit, slower ripening, and in certain cases was responsible for the development of a chlorotic condition of the foliage, the readily-absorbed potassium having depressed the uptake of magnesium, a vital constituent of chlorophyll.

5. A third top dressing might perhaps, be necessary when growing a very vigorous variety such as Scarlet Knight, or in the season after steaming, or during a prolonged period of dull weather.

6. The use of heavy top dressings, and especially their frequent application, should be avoided and such practice can only create conditions inimical to satisfactory growth and cropping.

7. The potassium-magnesium ratio in the growing medium should be controlled, remembering that the wider it is the more the likelihood of chlorosis occurring, and it is worth noting the relationship between high potassium manuring, magnesium deficiency, and 'green-back' of tomato fruits.

8. Where no potassium, or a moderately heavy basal dressing is given, there may be a positive response in regard to yields, from top dressings up to four in number, but more than four applications generally seem to cause a depression.

9. There is some evidence to suggest that the needs of the variety Potentate in respect of iron may be somewhat greater than those of certain other commercial varieties, and the possible relationship between this and the occurrence of 'green-back' of the fruit is receiving further attention.

SUMMARY.

The results of further studies on the effects of varying concentrations of potassium on the growth, vigour, and cropping of tomato plants of the variety Potentate are presented, special attention having been given to the number of top dressings likely to yield economic returns. The vital importance of giving a satisfactory basal dressing of potassium as a prerequisite to obtaining maximum benefit from top dressing is stressed. Recommendations are made with regard to the frequency of top dressing, bearing in mind current commercial practice in this respect. [The stage of plant development at which these dressings might be applied will be discussed in a future paper]. Certain aspects of magnesium and iron deficiency are discussed, and in respect of the latter trouble attention is drawn in particular to the stage of plant development at which it is likely to appear, so that timely measures could be taken to prevent it.

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USE AND VALUE OF PHOSPHATES

By JOHN BARRY, B.Agr.Sc.

Of the artificial fertilisers available to Irish farmers in normal times, those containing phosphates are by far the most widely used. From the farmer's point of view this fact is easily explained because an application of phosphate either in a soluble or an insoluble form usually results in an increased yield of crops, the increase being in many cases apparent over an extended period of years. In other words the farmer is conscious of an increased financial return as a result of the capital expended on phosphates.

Prior to 1840, the only known source of phosphate for agricultural purposes was bone and it has been stated that the practice of applying bones to land began in the neighbourhood of Sheffield where the cultery industry flourished. In the preparation of bone handles for the cutlery the finer particles and dust remained as a waste product and an outlet had to be found for this waste, with the result that in time it came to be used as a fertiliser. The results were so gratifying that the demand for bone waste soon exceeded the supply and the industry of grinding bones for agricultural purposes soon grew up in many parts of England. At one period large quantities of bones were imported from the Continent for grinding and even with these imports there was not sufficient ground bone available for manurial purposes.

Liebig, frequently referred to as the father of agricultural chemistry, suggested about 1840 that the phosphorus of bones would be much more readily available to plants if the bones were pre-treated with sulphuric or hydrochloric acid. At about the same time J. B. Lawes of Rothamsted took out a patent which covered the treatment of bones with sulphuric acid for the manufacture of phosphate as a fertiliser. This resulted in the famous litigation between Liebig and Lawes concerning the rights to the patent, which concluded by the withdrawal of patent rights for the treatment of bones with sulphuric acid.

The phosphorus in raw or "green" bone is present in the form of tricalcic phosphate, a form which is insoluble in water and consequently not readily available as plant food but which becomes slowly available due to the action of soil water. The treatment of bone with sulphuric acid converts some of the tricalcic phosphate present into the monocalcic form which is water-soluble and consequently readily available as plant food..

It is not surprising that as the demand grew, sources of phosphates other than bones were sought after. It is known that mineral phosphates were prospected for in Estremadura and about 1845 "coprolites" were discovered

in Cambridgeshire. "Coprolites" consist of a nodular form of calcium phosphate and it is maintained that the phosphate present is of organic origin. Deposits of rock phosphate were subsequently found in many parts of the world including the Gafsa district of North Africa, the island of Nauru in the Pacific, the Somme area in France and parts of Belgium. Large deposits of pebble phosphate were also discovered in river and creek beds in Florida. The phosphate contained in these mineral deposits is in the form of tricalcium phosphate which is not readily available as plant food.

When mineral or rock phosphate is treated with sulphuric acid the resultant product is the well-known superphosphate. The acid combines with the mineral phosphate to give monocalcic phosphate and gypsum. The manufacturing process of superphosphate consists of treating finely ground mineral phosphate with sulphuric acid. During the chemical action of the acid on the phosphate carbon dioxide gas is given off and this blows holes in the mass of ground phosphate, giving it a honeycomb structure. Gypsum is also formed and, combining with moisture, it forms into a hard mass. The material is then ground and bagged. Rocks containing the oxides of iron or aluminium are unsuitable for the manufacture of superphosphate because iron and aluminium phosphates are formed and as these materials are insoluble they are of little or no value as plant food.

Monocalcic phosphate, being soluble in water, lends itself to greater dispersion in the soil than could ever be achieved by mechanical means. This fact, combined with the relatively quick action of the fertiliser, would seem to account for its overwhelming popularity over the other phosphatic manures for a long period of years. Since all the tricalcium phosphate of mineral phosphate is not converted to the monocalcic form in the manufacture of superphosphate, a chemical reaction takes place between the tricalcic and monocalcic forms present which results in the formation of dicalcic phosphate, a form which is less soluble than monocalcic phosphate. This type of phosphate is known as reverted phosphate and is frequently found in superphosphate which has been stored over a long period.

Mineral phosphates used in this country usually contain from 50 per cent. to 60 per cent. of tricalcic phosphate and superphosphate from 30 per cent. to 35 per cent. of water-soluble phosphate. On the manufacture of superphosphate about 11 cwts. rock phosphate will produce about a ton of superphosphate.

Another form of phosphate which has become extremely popular, especially for grassland, in recent years is mineral phosphate, which consists of finely ground rock phosphate. For very many years experiments carried out with ground mineral phosphate gave disappointing results but it is now known that these poor results were attributable to the coarse grinding of the rock rather than to any other cause. For best results a fineness of grinding of at

least 80 per cent. is essential, that is to say 80 per cent. of the material must pass through a standard sieve which contains 10,000 holes per square inch. Ground mineral phosphates have given very good results in this country when applied to grasslands which are deficient in phosphate, especially in areas where the rainfall is high. Although not so quick-acting as superphosphate, results from an application of ground phosphates are very frequently noticeable over a long period of years. Mineral phosphate of North African origin, being soft and consequently easily ground, was the most widely used in this country when available.

Basic slag, always an extremely popular fertiliser for grassland, contains yet another form of phosphate—silicophosphate. This form is insoluble in water but is soluble in weak acids, such as a 2 per cent. solution of citric acid. Slag is to a certain extent comparable as a fertiliser with the bone residue from the cutlery industry of Sheffield in that it also is a waste product. Steel manufactured from pig iron containing phosphorous is brittle and consequently unsuitable for many industrial purposes. In 1856 the Bessemer process for the manufacture of steel was introduced. It was found that when a blast of air was passed through molten pig iron many of the impurities were removed. Containers, known as converters and capable of being rotated, were introduced and perforations at the bottom of these permitted the forcing of air through the molten pig iron. It was usual to line these converters with silica and clay. A slag containing some of the impurities present in the pig iron was formed but the process failed to remove the phosphorus. In 1878 Thomas and Gilchrist introduced what became known as the Basic Bessemer Process of steel manufacture. In this process the converter is lined with calcined dolomite instead of silica and clay. The change of lining material facilitated the removal of the phosphorus and consequently a higher-grade steel was produced. For years the slag was simply dumped in the neighbourhood of the steel works but in the eighties of the last century it was found that merely by grinding the slag a valuable phosphatic fertiliser was obtained. Slags resulting from the manufacture of steel by the Basic Bessemer Process may contain from 35 per cent. to 40 per cent. of total phosphates.

In another method of steel manufacture, known as the Open Hearth Process, the pig iron and hæmatite are heated in containers by producer gas. The container is usually lined with siliceous material or dolomite. If a high percentage of sulphur is present lime is added, and the addition of this material lowers the phosphate content and renders the slag formed less fuseable. Fluorspar is added to render the slag more fuseable but this addition decreases the solubility of the resultant slag in weak acid. Slag, in addition to silicophosphates, contains free lime and iron sulphides and iron oxide.

The value of slag as a fertiliser depends mainly on three factors :—(1) Total phosphates present, (2) Citric solubility, *i.e.*, percentage soluble in 2 per cent. citric acid, (3) Fineness of grinding. Slag resulting from the manufacture of

steel by the Basic Bessemer Process and from the Open Hearth Process usually have a citric solubility of 80 per cent, while that from the Open Hearth Fluorspar Process has a solubility of about 40 per cent. only. As slag contains free lime it cannot be used in mixtures containing sulphate of Ammonia, owing to the chemical reaction which takes place between the two substances, and consequently slag cannot be recommended for mixtures. It is, however, pre-eminently suitable for grassland especially grassland in which there is a deficiency of lime as well as of phosphate.

There are two so-called "natural" sources of phosphate, namely, guano and farmyard manure. In our circumstances guano is mainly of academic interest because in recent years very little of the material has been available in this country. The word guano is from the Spanish for dung and the material consists of the excrement of sea birds, together with such substance as fish-refuse, seaweed, feathers and carcases. The material was usually imported from islands off the coasts of Chile and Peru—practically rainless areas where countless sea birds congregated and where in time a huge accumulation of excreta developed which in the intense heat of those latitudes became desiccated. Guano as usually marketed consisted of a loose, dry powder with a greyish brown colour. Guano from the Chile and Peru regions contained from 8 per cent. to 11 per cent. of phosphoric acid in addition to varying amounts of Nitrogen and Potash. Where guano accumulations occur in districts of high rainfall the phosphate is partly leached out by the water and consequently the phosphate content is smaller and less soluble than in guano from drier regions.

Farmyard manure usually contains from 2 per cent. to 5 per cent. of phosphoric acid and the amount of phosphate present in any sample of dung will depend on many factors such as (1) the type of animal producing the dung, (2) the litter used, (3) the type of food fed, and (4) storage of the dung. Young, growing animals and animals in milk absorb more of the phosphates from food than do fully matured animals. As some phosphate is contained in the liquid excrement, the extent to which this can be absorbed by the material used for bedding will influence the final phosphate content of the manure. In addition certain materials, such as cereal straws used for bedding, contain some phosphate which eventually finds its way back to the land. It is only natural to expect that animals fed on foods rich in phosphate will produce manure which is relatively richer in this mineral than will similar animals fed on food of smaller phosphate content. Again, in cases where dung is improperly stored the phosphate content of the material is reduced by being leached out by rain and lost in drainage.

Early in the nineteenth century it was discovered that phosphate is necessary for plant growth. At that period the functions of phosphate in the nutrition of the plant were not clearly understood but since then various functions of the mineral have been demonstrated. In the period of early growth phos-

phate, or more correctly phosphoric acid, encourages root development this being particularly so in the case of the fibrous root system of plants. During later growth phosphoric acid hastens ripening and in the case of cereals there is a proportionate increase in the weight of grain to the weight of straw. Phosphate is also connected with the formation of chlorophyll, the green colouring matter of plants, without which normal growth and development is not possible.

Perhaps the most striking results are obtained from phosphate when it is applied to the poorer types of grassland. Not only are the grasses greatly improved but Wild White clover begins to flourish where it was almost entirely absent before application of the phosphate. In fact many farmers of an older generation entertained the belief that the seeds of Wild White clover were present in some mysterious fashion in phosphatic fertilisers. What they did not realise was that the Wild White clover was always present in their pastures but was so impoverished and stunted that it escaped notice beside its bigger-growing neighbours. The action of phosphate on the clover plant is twofold. In the first instance it supplies a food essential for vigorous root development and, secondly, it is essential for the activity of the *nodule bacteria*. These bacteria are symbiotic and live in the nodules found on the roots of clover plants. Their function is to capture the free nitrogen of the atmosphere and render it available to the plant. Not only do these bacteria supply a sufficiency of nitrogen to the clover plant but they leave a residue of this very valuable fertiliser in the soil for the use of other vegetation. Consequently if these *nodule bacteria* cannot function normally owing to phosphate starvation not only does the farmer lose the advantage of a vigorous clover crop but also the valuable nitrogenous residues for future crops.

Of the many minerals necessary for normal healthy growth and development of the animal body phosphates may be classed among the most important. One of the major functions of phosphates is in the development of bone. Phosphate also enters into the composition of many tissues and milk. In cases where a deficiency of this mineral occurs the animal becomes unthrifty and develops an unhealthy-looking coat and malformed bones. In parts of South Africa where a severe deficiency of phosphate occurs cattle grow very slowly, the sex organs fail to develop properly and, in addition, lameness and emaciation are not unknown.

In bone, phosphate is deposited in conjunction with calcium in the form of calcium phosphate. In the growing animal the calcium and phosphate absorbed from the digested food go towards the building up of the skeleton and any surplus consumed is stored in the bone to be drawn upon at a future time should the necessity arise. Fully grown animals, with the exception of those in milk and pregnant animals, excrete the greater portion of the phosphate consumed and hence it finds its way back to the soil as dung and to a

lesser extent, as urine. The proportion of calcium to phosphate in a diet is of the utmost importance, a suitable proportion being 1 part to 2 parts of calcium to 1 part of phosphate. It has been demonstrated that animals on a diet deficient in calcium will draw on the calcium phosphate of the skeleton to supply the deficiency of the element in the diet with the result that phosphate is excreted to the detriment of the skeleton. A somewhat similar occurence takes place when a growing animal or an animal in milk is fed on a diet containing a sufficiency of phosphate but lacking in calcium. In such a case the animal is unable to absorb the phosphate and consequently develops symptoms typical of an animal suffering from a deficiency of this mineral. Since milk is nature's food for the young of mammals it is not surprising to find that it contains both phosphates and calcium and, furthermore, contains them in a proportion suitable for absorption by the young growing animal. Consequently for the health and well-being of mother and progeny it is essential to have the former on a diet containing not only a sufficiency of phosphate and calcium but also to have a correct proportion of these minerals.

The outstanding results so frequently obtained in this country from applications of phosphates are indicative of the fact that many of our soils are poor in reserves of this fertiliser. The agricultural economy of the country has for a very long period been based largely on the export of store cattle, pigs and pig products, poultry and poultry products, all of which had either directly or indirectly obtained their requirements of phosphate from the soil, with the exception of that obtained from imported foods. Milk production has also caused a drain on the phosphate reserves of the soil because it has been customary to feed large quantities of skim or separated milk to young calves and pigs and, to a lesser extent, poultry. While it was customary for the majority of farmers to apply phosphates to cultivated crops all too many did not realise that a serious drain of this element from their pastures was in progress with the result that to-day the reserves of phosphate in many of our pastures are at a very low level. Phosphates, in contrast with certain other fertilisers, are not easily washed out of the soil. The soluble forms of the fertiliser, such as superphosphate, are temporarily fixed in the soil but they later become gradually available to plants. Farmers who invest capital in applications of phosphates to their lands are amply repaid in the form of increased crop yields and in the production of healthier and more thrifty livestock.

REPORT OF THE SEED PROPAGATION DIVISION, 1945.

WEATHER CONDITIONS.

January, 1945, was a very cold month, the mean temperature of 37 degrees F. being 5 degrees below the January average. The weather was fine and dry till the 18th of the month when a heavy fall of snow occurred, accompanied by frost which persisted till the end of the month. Much rain fell during the first three weeks of February so that work on the land, already much delayed, was further retarded. Very good weather prevailed during the last week of February and the first fortnight of March when much corn was sown. During the second half of March frequent showers alternating with sunshine stimulated sown cereals to rapid growth. These satisfactory weather conditions prevailed until mid-April when brilliant sunshine and temperatures reaching 66 degrees F. prevailed, resulting in exceptionally advanced growth. However, harsh north and east winds set in at the end of the month accompanied by severe frosts. Extensive damage was done to vegetation.

There was much rain during a sunless May. In June there were frequent showers, though there was a fair amount of sunshine. There was much heavy rain in July resulting in extensive lodging and tossing of corn. Hours of recorded sunshine were 42 below the average for the month.

The first half of August was very fine and warm, but a gale accompanied by over ½-inch of rain on the 21st, did much damage to standing corn and crops in stook. During the subsequent week, harvesting was general. On the 31st there was a further fall of over an inch of rain. The first week in September was very fine, warm and sunny, but was followed by 15 consecutive "rain" days. During this critical period, over 3 inches of rain fell. Standing crops could not be cut, stooks were thrown and soaked, and threshings brought to a standstill. Four gales were recorded during this period.

Good weather which began in the last week of September continued until the 19th October, providing excellent conditions for late threshings. Weather then became wild and stormy. There was much heavy rain and flooding of tidal areas. The mean temperature for October was the highest since 1908, and November was also an unusually mild month, though having less sun than normal. With the exception of one broken week, conditions for cultivation and work on the land were good.

There was a succession of fogs, ground frosts and stormy weather, with rain on 26 days, in December, so that cultivation and sowing of winter wheat came to a standstill. Heavy soils became water-logged and tidal areas were subjected to very bad flooding.

As in previous years the bulk of the barley propagations and other investigational work was carried out at the Cereal Station, Ballinacurra, Co. Cork, in close collaboration with Messrs. A. Guinness, Son and Co., Ltd., at whose Experimental Maltings the malting tests were conducted. The work consisted of the usual pure line propagations, large scale variety, half-drill strip and other experiments.

Pure line propagations of Red Marvel and April Red Bearded wheats and Black Tartary oats were maintained at the Cereal Station and extension plots of April Red Bearded Wheat, Victory II and Glasnevin Triumph oats were grown in the neighbourhood of Ballinacurra.

BARLEY.

The method adopted in 1929 in the selection of Spratt-Archer 37 No. 3 was again adopted in the selection of Spratt-Archer 37 No. 3 and Spratt-Archer 37 No. 4. This method consists of sowing five grains from every fifth plant of a single line in the preceding year. The pure line is thus composed of twenty-five five-grain lines. Each of the other varieties was propagated by taking the requisite amount of seed from the single line grown in 1944.

In addition to the pure lines mentioned above forty-five single plant selections were grown in the new Cage at the Cereal Station, Ballinacurra. These were as follows:—Spratt-Archer 37/6, Spratt-Archer 37/6, No. 7; Spratt-Archer 37 No. 4 (five grains from each of twenty-five plants); Spratt-Archer 37/6/3; Spratt-Archer 37 No. 3 Selection 7, Archer Goldthorpe 4/5/1, Spratt, Archer, Goldthorpe, Old Irish, Button Malting, Victory, D.S.K. Binder, Plumage Archer, Plumage, Hybrid No 7, Black Himalayan, Abed Kenia, Kenia, Naked Barley, Golden Archer 1, Golden Archer 2, Gold, Goldberg, Goldberg 2, Spratt-Archer 37 No. 3 x Victory 1, Glabron, Pearl, Donegal Six-Rowed, July Six-Rowed, Beaven's F112, Beaven's 49/14/3, B244, Spratt-Archer 37 No. 3 H.9 x Golden Archer 2 No. $\frac{1}{1}$, Spratt-Archer 37 No. 3 H.9 x Golden Archer 2 No. ½, Spratt-Archer 37 No. 3 H.9 x Golden Archer 2 No. 2, Spratt-Archer 37/9 x Golden Archer 2 No. 1, Spratt-Archer 37/9 and Golden Archer 2 No. 2, Maja, Beaven's 54/12/3, Camton, Pioneer, Hordeum Defieiens No. 16, Hordeum Defieiens No. 16 x Irish Archer, Beaven's 57/8.

Garden, Field and First pedigree plots as follows were grown on the farm of John H. Bennett, Ltd., Ballinacurra:

Garden Plots.

Spratt-Archer 37 No. 3 (25 lines) Ref. No. B. 10b.
Spratt-Archer 37 No. 3 (25 ears for experimental purposes).
Spratt-Archer 37/6/3.
D.S.K. Binder.

Plumage Archer.
Plumage.
Hybrid No. 7.
Abed Kenia.
Kenia.
Camton.
Pioneer.
Beaven's 57/8.
Spratt x Archer F.4 (70 selections).
Spratt x Archer F.3 (21 selections).
Spratt-Archer x Spratt (10 selections).
Spratt-Archer x Archer (20 selections).
Kenia x Spratt-Archer (20 selections).

Field Plots.

Spratt-Archer 37 No. 3.
Spratt-Archer 37 No. 3 Selection 7.
Spratt x Archer F.4.
Beaven's 54/12/3.
D.S.K. Binder.
Spratt-Archer 37 No. 3 H.9 x Golden Archer 2 No. ½.
Spratt-Archer 37 No. 3 H.9 x Golden Archer 2 No. 2.
Spratt-Archer 37/9 x Golden Archer 2 No. 2.
Spratt-Archer 37/9 x Golden Archer 2 No. 1.

First Pedigree Plots.

Spratt-Archer 37 No. 3	4 acres
D.S.K. Binder	1 acre
Spratt-Archer 37 No. 3 Selection 7	1 acre
Spratt-Archer 37 No. 3 H.9. x Golden Archer 2 No. 2	1 acre
Spratt-Archer 37/9 x Golden Archer 2 No. 1	1 acre

The produce of these plots will be available in 1946 for further propagation and Large Scale Variety Experiments.

Second Pedigree plots with following quantities of seed of Spratt-Archer 37 No. 3 were grown under contract with the following farmers in the neighbourhood of Ballinacurra:—

	Brls.	sts.
R. Barry, Broomfield, Midleton	5	8
J. Tait, Inch Glebe, Whitegate	15	8
M. Kellcher, Geragh, Ballinacurra	3	4
J. Hegarty, Ballinbeg, Rostellan	4	12
J. O'Reilly, Ballinabointra, Carrigtwohill	3	11
	32	11

The produce of these plots will be available for distribution as nucleus stocks of pedigree seed in the Spring of 1946.

For a number of years the Department has had in operation a scheme under which nucleus stocks of Pedigree Spratt-Archer barley are distributed each year to members of the Irish Maltsters' Association and others interested in seed barley distribution. Those who obtain such stocks undertake to have them grown with reliable farmers; to buy the produce if suitable for seed purposes and to distribute it to growers in the following season. Under the Scheme 408 barrels of Pedigree Spratt-Archer 37 No. 3 were distributed to the following:—

Messrs.	Minch, Norton & Co. Ltd., Athy	69 brls.
,,	Minch, Norton & Co., Ltd., Nenagh	20 ,,
,,	Minch, Norton & Co., Ltd., Bagnelstown ..	15 ,,
,,	Minch, Norton & Co., Ltd., Barracore ..	15 ,,
,,	Minch, Norton & Co., Ltd., Stradbally ..	20 ,,
,,	P. O'Meara & Sons, Ltd., Thurles	10 ,,
,,	N. Hardy & Co., Ltd., 72, Park Street, Dundalk	10 ,,
,,	Cairnes, Ltd., Drogheda	10 ,,
,,	J. Bolger & Co., Ltd., Ferns, Co. Wexford ..	10 ,,
,,	Birr Maltings, Ltd., Birr	10 ,,
,,	Beamish & Crawford, Ltd., Cork	5 ,,
,,	W. B. Nunn & Co., The Maltings, Wexford ..	10 ,,
Johnstown Castle, Agricultural College, Wexford ..		6 ,,
Messrs.	F. A. Waller & Co., Ltd., Banagher	12 ,,
,,	Geo. Read & Co., Ltd., Roscrea	14 ,,
,,	Joshua Watson & Co., Ltd., Carlow	45 ,,
,,	Joshua Watson & Co., Ltd., Leighlinbridge ..	15 ,,
,,	W. J. O'Keefe & Son, Wexford	10 ,,
,,	D. E. Williams, Ltd., Tullamore	35 ,,
,,	P. &. H. Egan, Ltd., Tullamore	23 ,,
,,	J. & A. Tarleton, Ltd., Tullamore	10 ,,
,,	R. Gibney & Co., Ltd., Portlaoighse	10 ,,
Mr. A. J. M. Reeves, Athgarvan Maltings, Co. Kildare ..		4 ,,
Messrs.	The North Tipperary Maltings, Ltd., Nenagh ..	12 ,,
,,	R. Perry & Son., Ltd., Rathdowney	8 ,,
		408

In addition to the above the following quantity of seed barley was also distributed:—

D.S.K. Binder.

To the Agricultural School, Athenry, Co. Galway . 10 brls.

INSPECTION OF GROWING CROPS FOR SEED PURPOSES.

In order that those who co-operate in the scheme for the distribution of Pedigree Spratt-Archer seed might have information regarding the suitability of the produce for seed purposes, the Department arranged to have the crops which were grown for this purpose inspected by the Agricultural Instructors before harvest. For inspection purposes the crops were divided into three classes:—(1) Crops grown from seed which was obtained from Ballinacurra in 1945. (2) Crops grown from seed which was the produce of seed obtained from Ballinacurra in 1944 and (3) crops grown from commercial seed of Spratt-Archer 37 No. 3. As regards (3) inspections were only made in those cases where the maltsters concerned were of opinion that they would not have sufficient seed otherwise and so required inspections made of the most promising crops grown from commercial stocks.

A total of 6,799 statute acres was inspected, of which 5,813 acres were reported as likely to produce grain suitable for seed purposes if properly harvested. Of the 570 acres inspected under category (1) 35 acres or 6.1 % were rejected because of smut or an undue admixture of wheat, oats or other barley.

In category (2) 4,320 acres were inspected and 550 acres or 12.7 % were rejected. The rejections were chiefly due to other barleys having been sown in the same field, poor crops, smut and the presence of an undue amount of oats and wheat. Under category (3) 1909 acres were inspected and 401 acres or 21.0 % were rejected for the same causes as in category (2).

From the number of crops rejected it is apparent that some distributors did not take sufficient care in the selection of growers and in having the seed properly treated with a fungicidal dressing before it was despatched to growers. It is desirable that firms co-operating in this scheme should exercise care in selecting growers and in treating the seed with a suitable powder dressing before it is despatched to the growers.

LARGE SCALE BARLEY VARIETY EXPERIMENTS.

These experiments were carried out at ten centres in seven counties, one in each of Counties Cork, Tipperary, Kilkenny, Kildare and Louth, two in Offaly and three in Wexford. The seed used for the experiments was the produce of the first pedigree plots established at the Cereal Station, Ballinacurra, Co. Cork, in 1944. The area of the plots throughout was one statute acre. All the seed was dressed with Agrosan powder at the rate of 8 ozs. per barrel of seed. The three varieties sown at all centres were Spratt-Archer 37 No. 3, Spratt-Archer 37/9 x Golden Archer 2 No. 2 and Beaven's 54/12/3.

Sowing conditions were favourable and all plots were sown by the 13th April.

At all centres the seed germinated well and at the end of May there was a good braird on all plots. Yields were satisfactory but quality was not as good as usual.

The names and addresses of the growers, the nature of the soil and subsoil, the crops grown in the two previous years and the dates of sowing and harvesting are set out in Table 1.

In Table II are set out the weights of grain per statute acre, the commercial value of the grain as determined by independent valuers, and the total value of the grain, including screenings which were valued at 6d. per stone. The values thus determined are not those which would have been obtained in the season 1945 during which the price of barley was fixed at 35/- per barrel but they were based on an arbitrary price range closely related to the fixed price.

There were no significant differences between the varieties except in bushel weight in which respect Beaven's 54/12/3 was lower than either of the other varieties.

TABLE I.

Large Scale Barley Variety Experiments, 1945.

Centre No.	Name and Address of Grower.	Description of Soil.	Previous Crops	Date of Sowing	Date of Harvesting
1	Wm. Tait, Rostellan, Co. Cork	Medium Loam Subsoil Shale	1943 Beet 1944 Wheat	13/4/45	—— 21/8/45
2	P. Byrne, Ballygraugans, Co Wexford	Sandy Loam Subsoil Gravel	1943 Barley 1944 Beet	5/4 45	25/8/45
3	D. Morris, Tomahurra, Enniscorthy	Shale Loam Subsoil Shale	1943 Barley 1944 Roots	9/3/45	10/8/45
4	Mrs. Segrave, Dunany, Dunleer, Co. Louth	Strong Loam Subsoil Gravel	1943 Wheat 1944 Turnips	3/4 45	22/8/45
5	M Howlett, Ramsgrange, Wexford	Still Loam Subsoil Shale	1943 Oats 1944 Roots	10/4/45	16/8/45
6	M. P. Murch, Rockfield, Athy	Deep Loam Subsoil Gravel	1943 Barley 1944 Roots	20/3/45	13/8/45
7	W. Mullins, Dunmga House, Goresbridge	Strong Loam Subsoil Limestone	1943 Barley 1944 Oats	13/4/45	25/8/45
8	D O'Brien, Ballmanure, Tullamore	Gravelly Loam Subsoil Limestone	1943 Oats 1944 Roots	4/4 45	21/8/45
9	E. P. Ruttledge, Ballyeighan, Birr	Light Loam Subsoil Limestone	1943 Wheat 1944 Turnips	12 4/45	23/8/45
10	M Carroll, Belleen, Nenagh	Strong Loam Subsoil Limestone	1943 Wheat 1944 Hay	11/4/45	21/8/45

TABLE II.

Large Scale Barley Variety Experiments, 1945, Yield and Value of Grain per Statue Acre.

Centre	Spratt-Archer 37 No. 3				Spratt-Archer 37 9 x Golden Archer 2 No 2				Beaven's 54/12/3			
	Yield of				Yield of				Yield of			
	Dressed grain	Screenings	Value per Barrel	Total Value Including Screenings	Dressed Grain	Screenings	Value per Barrel	Total Value including Screenings	Dressed Grain	Screenings	Value per Barrel	Total Value including Screenings
	Brls. sts.	sts.	s. d.	£ s. d.	Brls. sts.	sts.	s. d.	£ s. d	Brls. sts.	sts.	s. d.	£ s. d.
Cork— Wm. Tait	10 7	3.5	35 0¼	18 7 6	11 3	3.5	35 2	19 15 2	10 10	3.0	35 2	18 15 2
Tipperary— M. Carroll	11 8	7.0	35 9	20 14 7	10 7	5 0	35 6½	18 13 6	11 13	5.0	35 7½	21 3 4
Offaly— E. P. Ruttledge ..	11 6	2 5	35 9	20 7 11	10 5	2 5	35 11½	18 12 1	12 8	4.0	35 6½	22 6 3
D. O'Brien	11 7	1.5	35 5	20 5 10	14 6	1.5	35 1	25 5 1	11 14	2 0	35 1¼	20 18 2
Kildare— M. P. Minch	13 2	2.0	35 10	23 11 4	12 6	3 0	35 9½	22 4 5	13 6	2.5	35 6	23 16 1
Kilkenny— W. Mullins	8 1	3.0	35 5½	14 7 5	9 11	3 5	35 6	17 5 8	8 3	5.0	35 4	14 11 10
Wexford— M. Howlett	12 10	4.0	35 4¼	22 8 8	14 0	4 0	35 6	24 19 0	12 13	7.0	35 2	22 14 1
P. Byrne	13 8	3 5	35 4½	23 19 4	12 8	3 5	35 6½	22 5 9	12 12	3.5	35 6½	22 14 11
D. Morris	9 14	2.5	35 8	17 13 6	8 2	1 5	35 5	14 8 6	8 1	2.5	35 2½	14 5 2
Louth— Mrs. Segrave	14 3	3 0	35 5½	25 4 7	14 13	1 5	35 7	26 7 10	14 0	1.5	35 6½	24 18 4
Total	116 2	32.5		207 0 8	117 13	29 0		209 17 0	116 0	36.0		206 3 4
Average ...	11 9 8	3 25	35 6	20 14 1	11-12 5	2.9	35 6	20 19 8½	11-9.6	3.6	35 4½	20 12 4

TABLE III.

Large Scale Variety Experiments, 1945, Analysis of Produce.

Grower	Spratt-Archer 37 No. 3				Spratt-Archer 37 9 x Golden Archer 2 No. 2.				Beaven's 54/12/3			
			On Dry Matter				On Dry Matter				On Dry Matter	
	Bushel Weight	Moisture	Weight of 1,000 Corns	Nitrogen	Bushel Weight	Moisture	Weight of 1,000 Corns	Nitrogen	Bushel Weight	Moisture	Weight of 1,000 Corns	Nitrogen
	lb.	%	grms.	%	lbs.	%	grms.	%	lbs.	%	grms.	%
Wm. Tait	47.7	20.0	24.8	1.85	49.6	20.0	29.0	1.72	47.4	19.6	26.4	1.68
M. Carroll	54.2	18.0	37.2	1.44	54.9	17.4	36.9	1.48	55.0	16.8	39.5	1.35
E. P. Ruttledge	54.8	18.0	37.2	1.45	54.2	18.4	37.4	1.37	50.7	22.5	37.4	1.44
D. O'Brien	51.0	17.9	31.6	1.30	48.6	21.1	32.5	1.40	47.2	19.4	30.9	1.54
M. P. Minch	53.9	18.6	34.2	1.32	53.0	19.2	34.0	1.30	52.4	18.4	34.8	1.31
W. Mullins	50.9	18.6	31.2	1.51	50.2	18.1	30.6	1.60	49.4	18.1	32.0	1.52
M. Howlett	51.2	18.4	29.9	1.45	50.8	19.2	31.4	1.42	49.4	18.6	30.4	1.39
P. Byrne	51.2	18.4	32.0	1.44	51.8	18.2	32.0	1.38	50.2	17.6	31.8	1.30
D. Morris	50.7	18.4	31.8	1.43	50.7	18.6	30.4	1.37	48.8	18.6	30.6	1.37
Mrs. Segrave	52.2	20.2	33.4	1.56	53.4	19.9	34.5	1.40	51.4	20.0	33.6	1.39
Total	517.8	186.5	323.3	14.76	510.9	193.1	328.7	14.44	501.9	189.6	327.4	142.9
Average	51.78	18.65	32.33	1.476	51.09	19.31	32.87	1.444	50.19	18.96	32.74	1.429

Half Drill Strip Experiment.

Three of these experiments were carried out on the farm of J. H. Bennett, Ltd. Each trial consisted of twenty-two strips of each variety under test, a strip being half the width of the corn drill. To ensure even sowing, the seed in each half of the corn drill was changed over for the sowing of the second half of the experiment. In order to maintain the sequence of the strips, the machine was driven up the field idle before commencing to sow the second half of the experiment.

In No. 1 experiment the produce of the 1944 field plot of Spratt-Archer 37 No. 3 was tested against the produce of the second Pedigree plot of the same variety, the object being to ascertain if the younger generation was maintaining the desirable qualities of the older generation. Owing to severe lodging no results were obtained from this experiment.

In No. 2 experiment Spratt-Archer 37 No. 3 was tested against Spratt-Archer 37 No. 3 selection No. 7. The results which are set out in Table IV. show that the standard variety Spratt-Archer 37 No. 3 yielded over half a barrel per acre more than selection 7. The qualitative results of the two varieties are fairly close.

In No. 3 experiment Spratt-Archer 37 No. 3 was tested against Spratt-Archer 37 No. 3 II.9 x Golden Archer 2 No. 2. The latter variety gave a significantly higher yield than the standard but its grain had a higher nitrogen content.

TABLE IV.

Half Drill Strip Experiments, 1945.

	No. 2 Experiment.						No. 3 Experiment.					
	Spratt-Archer 37 No. 3			Spratt-Archer 37 No. 3 Selection 7			Spratt-Archer 37 No. 3			Spratt-Archer 37 No. 3 H.9 x Golden Archer 2 No. 2		
		sts.	lbs.		sts.	lbs.		sts.	lbs.		sts.	lbs.
	a.	3	1	B.	2	12	a.	2	3	B.	2	11
	C.	3	3	b.	2	11	C.	2	11	b.	3.	0
	c.	3	4	D.	2	6	c.	2	9	D.	2	11
	E.	3	2	d.	2	10	E.	2	11	d.	3	1
	e.	3	4	F.	2	9	e.	2	10	F.	2	12
	G.	2	12	f.	2	10	G.	2	9	f.	2	13
	g.	3	3	H.	2	10	g.	2	8	H.	2	11
	I.	3	0	h.	2	10	I.	2	9	h.	2	10
	i.	3	2	J.	2	11	i.	2	10	J.	2	12
	K.	3	0	j.	3	3	K.	2	7	j.	2	12
	k.	3	4	L.	3	1	k.	2	6	L.	2	8
	M.	3	3	l.	3	3	M.	2	7	l.	2	6
	m.	3	3	N.	3	1	m.	2	9	N.	2	11
	P.	3	4	n.	3	2	P.	2	7	n.	2	11
	p.	3	2	Q.	2	13	p.	2	12	Q.	2	11
	R.	3	1	q.	3	5	R.	2	10	q.	2	13
	r.	2	9	S.	3	4	r.	2	10	S.	3	1
	T.	3	5	s.	3	4	T.	2	10	s.	2	11
	t.	3	7	V.	3	3	t.	2	11	V.	2	12
	W.	3	1	v.	3	4	W.	2	9	v.	2	13
	w.	3	0	X.	3	1	w.	2	11	X.	3	1
	Y.	3	1	x.	3	2	Y.	2	4	x.	3	4
Total ..		69	1		65	9		57	11		62	13
Average Moisture %		22.3			21.7			20.8			21.2	
*Average Nitrogen %		1.46			1.40			1.40			1.46	
*Average weight of 1000 Corn (grms.) ..		32.0			31.3			33.0			34.2	
Relative Malting quality		100.0			100.3			100.0			99.8	

*On dry matter.

Small Scale Quantitative Experiments, 1945.

In order to test the dependability of the results of small scale experiments conducted in the cages, and to determine if the results obtained from an experiment sown within the cage differed from those of a like experiment sown in the open field, two experiments were laid down, one in the New Cage and the other in the Middle Field using for both only one variety—Spratt-Archer 37 No. 3.

The results are set out in Table V.

For malting quality the average of the cage results is taken as the standard.

Neither for yield nor for any analytical figure is there any significant difference within the cage or the field experiment taken separately.

In the field, the yield was more than twice as high as in the cage and the grain was better filled as indicated by significant differences in bushel weight and 1,000 corn weight. The difference in malting quality between the field and cage is not significant.

TABLE V.

Small Scale Quantitative Experiment, 1945.

Average of Fifteen Plots.

	No. of Plants	No. of ears	Weight of ears	Weight of straw	Weight of grain	Co-efficient of Migration	Relative Malting quality	Nitrogen*	Weight* of 1000 Corns
			grms.	grms.	grms.	%		%	grms.
CAGE A. ...	89.9	146.3	181.9	267.3	149.2	33 1	99.2	1.40	34.3
B. ...	86.9	196.3	190.7	298.2	157.2	32.5	100.4	1.40	33.2
C. ...	86.7	191.7	179.9	270.8	148.0	33.0	100.1	1.38	33.4
D. ...	86.1	192.1	189.7	285 3	155.0	32.7	100.0	1.38	32.5
E. ...	92.1	190.9	180.6	267 5	148.6	33.3	99.1	1.36	32.3
F. ...	87.3	188.6	184.2	272.3	152.0	33.3	100.8	1.38	32.8
G. ...	86.7	190.1	182.4	301.4	149.4	31.7	100.1	1.38	31.4
H. ...	88.1	198 7	189.5	306.8	158.1	32.9	100.2	1.42	33.6
Average ...	87.98	186 8	184.8	283.7	152.2	32.81	100.0	1.388	32.94
FIELD A. ...	93.5	342.5	375.0	774.5	320.9	27.9	99 2	1.40	33.6
B. ...	94.7	346.6	384.4	776.9	328.3	28.4	99.1	1.40	34.4
C. ...	91.1	384.3	379.9	792.5	323.5	27.7	99.8	1 42	35.6
D. ...	92.9	352 1	394.1	797.3	334.7	28.1	99.7	1.38	34.4
E. ...	93.5	343 4	383.9	789.5	323 9	27.6	99.4	1.38	34.0
F. ...	92.7	340.1	375.7	786.5	319.9	27.6	99.3	1.36	33.9
G. ...	94.2	331 8	375.2	768.8	321.3	28.2	99.0	1.40	34.3
H. ...	93.9	349.2	390.8	804.6	331.3	27.7	99.2	1.38	33.8
Average ...	93.3	342.5	382.4	786.3	325 5	27.9	99.3	1.890	34.25

*On dry matter.

OATS.

Pure Line—A single plant selection and a garden plot of black Tartary Oats were grown at the Cereal Station in order to retain a pure line stock of this variety.

DEPARTMENT'S EXTENSION PLOTS.

In order to have available for distribution stocks of pedigree seed oats, Extension Plots of Glasnevin Triumph and Victory II oats were grown under agreement with selected farmers in the neighbourhood of Ballinacurra. These stocks were grown, harvested and threshed under the Department's supervision. The produce was kiln-dried, cleaned and made available for distribution in the Spring of 1946.

The following are the names and addresses of growers, together with the acreages and amounts of seed sown :—

GLASNEVIN TRIUMPH.

	Acres	Brls.	sts.
J. Barter, Inchiquin, Killeagh, Co. Cork ..	11½	13	2
S. Northridge, Ballymacsliney, Midleton ..	5	5	10
D. Keohane, Gortacruc, Midleton	9½	10	12
Mrs. Bourke, Ballintotas, Midleton ..	5	5	10
P. O'Keeffe, Ardra, Rostellan, Co. Cork ..	4	4	8
	35	40	0

This seed was obtained from the Albert Agricultural College, Glasnevin, Dublin.

VICTORY II.

	Acres	Brls.	sts.
Wm. Tait, Hermitage, Rostellan, Co. Cork ..	10	11	6
Wm. Tait, Buckstown, Rostellan, Co. Cork ..	7	8	0
J. Hegarty, Ballinbeg, Rostellan, Co. Cork ..	4	4	8
J. Tait, Inch, Glebe, Whitegate, Co. Cork ..	5	5	10
Wm. Nicholson, Springfield, Castlemartyr, Co. Cork	5	5	10
R. Scanlon, Geragh, Midleton, Co. Cork	4	4	8
	35	40	0

SCHEME FOR THE DISTRIBUTION OF PEDIGREE STOCKS OF SEED OATS.

Under the Department's scheme nucleus stocks of Pedigree Victory II and Ardri which were propagated in the Ballinacurra district in 1944 were distributed to Seed Merchants and others in the Spring of 1945 for further propagation.

These Pedigree stocks were supplied to merchants on condition that they would undertake to have the seed grown by reliable farmers, to purchase the produce, if suitable, and to retain it for seed purposes.

Under the above scheme, foundation stocks of Pedigree seed oats were supplied to the following in 1945:—

ARDRI.

The Superintendent, Agricultural School, Athenry, Co. Galway.
Johnstown Castle Agricultural College, Co. Wexford.
Messrs. Pedigree Seed Growers, Ltd., 151, Thomas Street, Dublin.
Irish Sugar Beet Growers Association, Ltd., Athy Road, Carlow.

Victory II.

The Superintendent, Agricultural School, Athenry, Co. Galway.
The Superintendent, Agricultural School, Clonakilty, Co. Cork.
The Superintendent, Agricultural School, Ballyhaise, Co. Cavan.
Messrs. Pedigree Seed Growers, Ltd., 151, Thomas Street, Dublin.
Messrs. J. H. Bennett, Ltd., Ballinacurra, Midleton, Co. Cork.

The Albert Agricultural College co-operated with the Department in the working of the foregoing scheme and stocks were distributed as follows:—

Ardri.

	Brls.	sts.
W. Drummond & Sons, Ltd., 57/58, Dawson St., Dublin	5	0
Joseph Grimes, Laytown Hse, Laytown, Co. Meath ..	3	0
National Institute of Agricultural Botany, Huntingdon Rd., Cambridge	2	8
Messrs. Pedigree Seed Growers, Ltd., 151, Thomas Street, Dublin	30	0
Cereal Station, Ballinacurra, Midleton, Co. Cork ..	10	0

Glasnevin Triumph.

	Brls.	sts.
Cereal Station, Ballinacurra, Midleton, Co. Cork ..	50	0
B. Spollen, c/o D. Williams, Tullamore, Offaly ..		4
L. Kavanagh, Balkanstown, Nurney, Co. Kildare ..		4

Glasnevin Success X.

	Brls.	sts.
Messrs. J. H. Bennett, Ltd., Ballinacurra, Midleton, Co. Cork	10	0
Messrs. Pedigree Seed Growers, Ltd., 151 Thomas Street, Dublin	100	0
Johnstown Castle Agricultural College, Co. Wexford ..	10	0
Messrs. W. Drummond & Sons, Ltd., 57/58, Dawson St., Dublin	5	0
J. M. Drew, Donacarney, Drogheda, Co. Louth ..	6	0

WHEAT.

In 1945 propagation plots of Red Marvel and April Red Bearded wheats were grown at the Cereal Station, Ballinacurra, Co. Cork, and an extension plot of five acres of April Red Bearded was grown under contract and under the Department's supervision by Mr. Wm. Tait, Hermitage, Rostellan, Co. Cork.

Under the scheme for the distribution of pedigree seed of spring wheats the produce of the 1944 extension plot of Red Marvel was distributed to the undermentioned in the spring of 1945 on the condition that the produce of it would be used for further propagation in 1946:—

Messrs. Pedigree Seed Growers, Ltd., 151, Thomas St., Dublin.

FLAX.

At the Cereal Station, Ballinacurra, Garden plots of the following varieties were grown:—Redwing, Bison, Buda, Newlands, Argentine Linseed, Boley, Golden and Concurrent.

SWEDES.

At the Cereal Station, Ballinacurra, seed stocks were raised from selected roots.

Seed thus produced was distributed in 1945 to the following:—

Messrs. Associated Seed Growers, Ltd., 16, Westmoreland St., Dublin.
Messrs. Seed Producers Ltd., Dame St., Dublin.

OAT VARIETY TRIALS

Trials to compare a new hybrid oat, Glasnevin Triumph, with Ardri were conducted in 1945 by the Instructors in Agriculture at 33 centres in 19 counties. Glasnevin Triumph was raised by the Plant Breeding Department of University College, Dublin, from a cross between Ardri and Glasnevin Success. Four stones of seed of each variety were sown at each centre. The yields of grain obtained are shown in accompanying table and further particulars of the trial at each centre may be obtained by applying to the Secretary of the County Committee of Agriculture.

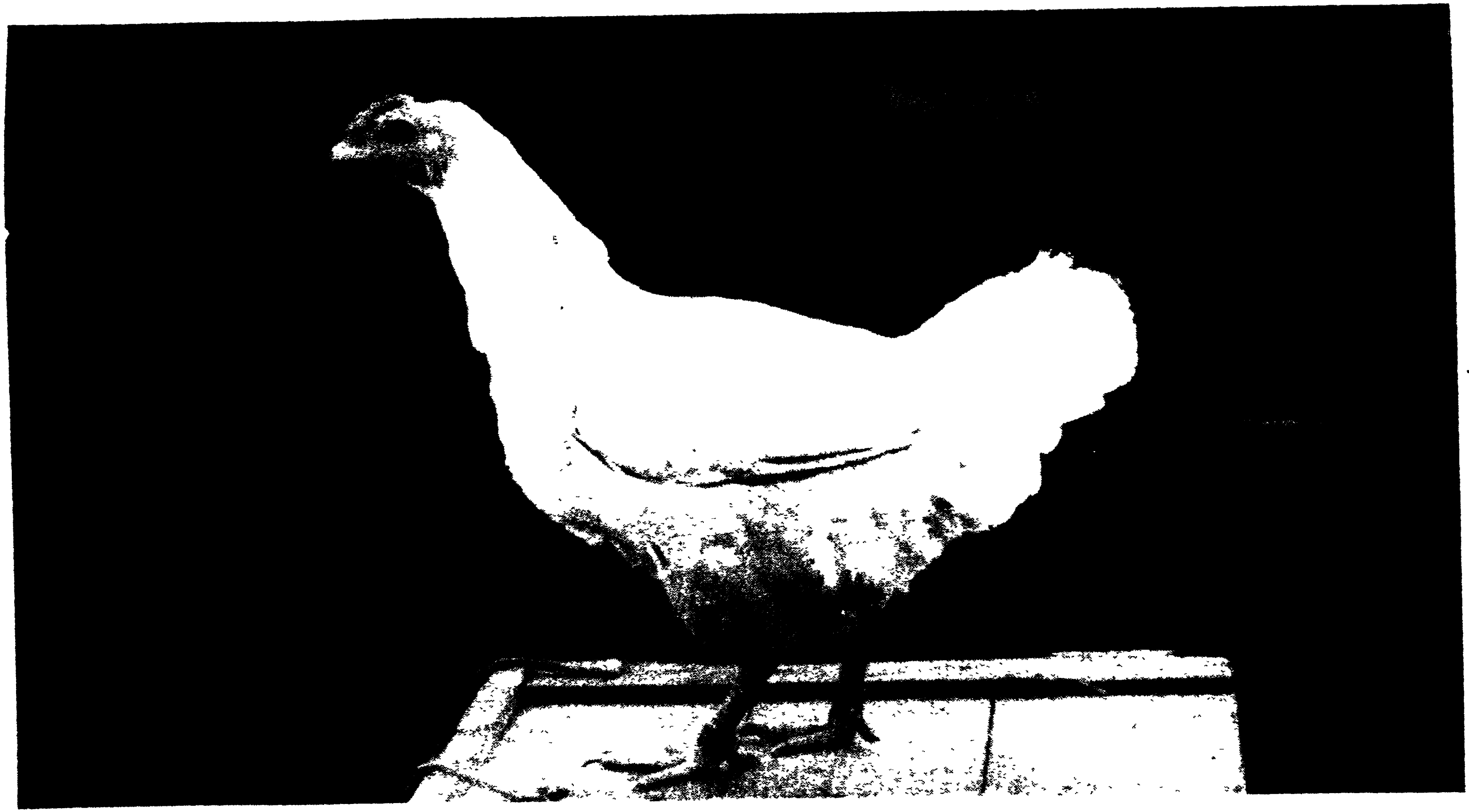
There was a general resemblance between the varieties in vegetative growth. Little lodging occurred and no appreciable difference between the varieties in this respect was apparent. The incidence of disease and pests was negligible except in Laoighis where, at one centre, Leaf Stripe was reported to be very prevalent and wireworms caused appreciable but apparently similar damage in both plots; in Westmeath where birds caused some loss of grain from Triumph during ripening; and at one centre in Wexford where both varieties were rather severely affected by Crown Rust.

Both plots were harvested on the same date at most of the centres but Triumph was stated to have ripened earlier, by 1 to 9 days, at the majority of those centres from which a difference in the date of ripening was reported.

At 15 of the 33 centres the yield of grain from Triumph exceeded that from Ardri by 1 cwt. or more per statute acre. At 12 centres the yield from Ardri was similarly greater than that from Triumph. At the remaining 6 centres the yield from the two varieties was about the same. These trials do not, therefore, reveal a significant difference in yielding capacity between the two varieties. Of 13 reports which indicated a difference in grain quality, 9 were in favour of Triumph, the grain of which was reported from a number of centres to be larger but darker than that of Ardri.

County	Yield of Grain per Statute Acre			
	Triumph		Ardri	
	c.	q.	c.	q.
Cork	36	3	32	1
	29	0	25	1
	29	1	27	1
	22	3	21	1
	26	1	21	3
Dublin	30	0	31	3
	36	3	28	2
Galway	25	2	27	0
	20	0	23	0
Kildare	28	0	28	2
Kilkenny	26	2	26	2
Laoighis	15	3	14	2
	26	0	27	1
Limerick	22	3	23	0
	30	3	29	0
	29	0	25	1
Louth	26	2	24	0
Meath	21	3	20	2
	23	3	20	1
Monaghan	25	0	25	0
Offaly	31	2	33	2
	28	2	26	0
Roscommon	24	0	26	2
	15	0	15	2
Sligo	25	0	23	0
Tipperary N.R.	23	3	26	2
Tipperary S.R.	22	0	23	0
	23	2	22	2
Waterford	27	3	30	2
Westmeath	26	0	29	1
Wexford	25	1	32	2
	21	0	22	1
Wicklow	24	3	21	3
Average (88 Centres)	25	3	25	1

NATIONAL EGG-LAYING TEST, 1944-1945



Bird No. 109 (Pen No. 23, White Wyandotte), owned by Mrs. K. Ryan, Farnane, Lisnagry, Co. Limerick, awarded the Special Prize for the bird (sitting breed) scoring the highest number of points during the Test.

Pen No. 18 (White Wyandotte), owned by Mrs. M. Connolly, Carrigamore, Corvally P. O., Co. Monaghan, which won the Silver Cup.

NATIONAL EGG-LAYING TEST, 1944-45.

The Thirty-third Egg-Laying Test, conducted by the Department of Agriculture, was held at the Munster Institute, Cork, during a period of 46 weeks, beginning on 1st October, 1944, and ending on 18th August, 1945. A total of 91 pens, each consisting of six pullets, having fulfilled the required conditions, was accepted and arranged in Sections as follows:—

Section I.—White Wyandotte	8 pens
Section II.—White Wyandotte (confined to holders of Hen or Hen and Duck Stations in 1944)	13 „
Section III.—Rhode Island Red	18 „
Section IV.—Rhode Island Red (confined to holders of Hen or Hen and Duck Stations in 1944)	23 „
Section V.—Any non-sitting breed	13 „
Section VI.—Any other utility breed	16 „

Station holders were, as heretofore, allowed to enter a second pen in one of the open sections

Only pullets which were certified by the Veterinary College, Ballsbridge, Dublin, as being non-reactors to the agglutination test for bacillary white diarrhoea were accepted.

Minimum Weights. The following were the prescribed minimum weights for the respective breeds:—

All non-sitting breeds ..	3 lb.
White Wyandotte	4½ lb.
Rhode Island Red	4½ lb.
Plymouth Rocks	5 lb.
Sussex	5 lb.
Any other sitting breed ..	5 lb.

Eggs were graded as follows :—

Egg Grades.

Special Grade.—$2\frac{1}{8}$ ozs. and over for the first eight weeks (1st October to 25th November, inclusive), $2\frac{1}{4}$ozs. and over throughout the remainder of the test.

First Grade.—A minimum of $1\frac{15}{16}$ ozs. for the first eight weeks (1st October to 25th November, inclusive), and a minimum of 2 ozs. during the remainder of the test.

Eggs which weighed less than the weight prescribed for first grade were recorded but were not counted for scoring purposes.

System of Scoring.

The system of scoring for the award of prizes was as follows :—

(*a*) Only special and first-grade eggs were counted for scoring purposes.

(*b*) The scoring for each egg of these grades was similar and as follows :—

Three (3) points for the first 12 weeks (1st Oct. to 23rd Dec.).

Two (2) points for the next 24 weeks (24th Dec. to 9th June).

Three (3) points for the remaining 10 weeks (10th June to 18th August).

(*c*) Points were not awarded for eggs defective in colour, shape or shell texture, but all such eggs were included in the records of production.

Ineligibility for Section Prizes.

Section prizes were not awarded to pens which produced less than 900 scoring eggs nor special prizes to those laying less than 1,000 scoring eggs. Pens which produced more than 20 per cent. of eggs under first grade were not eligible for prizes.

The following birds were not eligible for individual awards :—

(1) Birds that failed to complete the test.

(2) Birds that failed to pass the blood agglutination test for bacillary white diarrhœa at the conclusion of the test, and those showing breed or other defects considered undesirable in breeding stock.

(3) Birds that failed to reach, at the conclusion of the test a body weight of half a pound over the minimum weight prescribed for the breed at the commencement of the test.

Egg Yields. Making no allowance for deaths, the average number of eggs per bird was 178.9. The average number of eggs per bird for which a record for the full 46-week period was available was 185.8 (see Table II). The corresponding figures in the previous test were 168.8 and 183.3 respectively. The average production per bird during each of the twelve periods for each breed is given in Table III.

Egg Size. Seven pens produced more than 20 per cent. of eggs under first grade.

Egg Weights. The average weight of egg for each of the competing breeds is shown in Table IV. The average weight per dozen eggs for all breeds was 26.8 oz., as compared with 26.5 oz. for the previous test In Table V are given the number and percentage of the different grades of eggs for each breed in respect of birds which completed the full 46-week period.

Copper Rings. Of the 483 birds which completed the full 46-week period, 149 or 30.8 per cent. laid 200 or more special and first-grade eggs and not more than 20 per cent. under first grade. Of these, 134 were leg-banded with numbered sealed copper rings. Copper rings were withheld from the following 15 birds which were not suitable for breeding purposes :—

(*a*) Breed Standard Defects :—
- 6 White Wyandotte.
- 5 Rhode Island Red.
- 2 White Leghorn.

(*b*) Under Prescribed Weight :—
- 1 White Wyandotte.

(*c*) Constitutional Defects :—
- 1 Rhode Island Red.

The rings were distributed as follows :—

2 pens	.. ..	five copper rings each.
8 ,,	.. ..	four ,, ,, ,,
12 ,,	.. ..	three ,, ,, ,,
15 ,,	.. ..	two ,, ,, ,,
26 ,,	.. ..	one ,, ring ,,

The egg records for birds which were awarded copper rings are shown in Table VIII.

A total of 182 birds, representing 27.3 per cent. of the number surviving the full period of the test, laid over 169 but less than 200 special and first-grade eggs. Birds which laid more than 20 per cent. of eggs under first grade are not included in the foregoing total (see Table VII).

Mortality. During the period of the test 68 birds died, representing a mortality of 11.5 per cent., and a decrease of 1.0 per cent. as compared with the previous test. The distribution of the total deaths amongst pens was as follows :—

1 pen	.. ..	5 deaths
2 pens	.. ..	4 ,, each.
4 ,,	.. ..	3 ,, ,,
8 ,,	.. ..	2 ,, ,,
22 ,,	.. ..	1 death ,,

In the remaining 54 pens all birds completed the test. Table IX gives particulars of the birds that died and the cause of death in each case. Peritonitis and oviductitis were responsible for almost 48 per cent. of the mortality. The incidence of tuberculosis was higher than in recent tests.

B.W.D. Test. At the conclusion of the test the birds were submitted to the agglutination test for bacillary white diarrhœa, and there were no reactors.

Feeding. The rations fed consisted solely of home-produced foods. The system of feeding was similar to that in previous tests. The birds were fed three times daily. The morning feed consisted of half the grain ration given as scratch feed in the litter ; the mid-day feed of wet mash, and the evening feed of the remainder of the grain ration fed in troughs. Dry mash was fed *ad lib.* and was made up to the following formula :—

2 parts by weight	Barley Meal.
2 ,, ,, ,,	Pollard.
2 ,, ,, ,,	Rolled Oats.
2 ,, ,, ,,	Crushed Oats.
1 part ,, ,,	Fishmeal.
½ ,, ,, ,,	Grassmeal.
½ ,, ,, ,,	Bran.

The wet mash consisted of equal parts by weight of the dry mash and boiled potatoes. The morning grain feed was oats and the evening feed was made up of two parts oats and one part barley. Cabbage, kale, turnips and mangels were fed during winter and spring. Limestone grit was allowed *ad lib.*

The following quantities of foods were consumed :—

Mixed Meals	.. .. ..	**51,744 lb.**
Potatoes	.. .. ..	**16,560 lb.**
Grain	.. ..	**30,688 lb.**
Limestone Grit	.. ..	**896 lb.**

NOTES ON COMPETING BREEDS.

WHITE WYANDOTTE.

Sections I and II.

The twenty-one pens in these sections were composed of birds mainly of very high quality, only a few inferior ones having been entered. Egg production reached a high level, egg weight and quality were satisfactory but the mortality in these sections was higher than in the previous test.

The winning pen, No. 18 in Section II, owned by Mrs. M. Connolly, Carrigamore, Corvally, Co. Monaghan, also won the Silver Cup. The six birds were of excellent quality and laid 1,360 special and first grade scoring eggs.

RHODE ISLAND RED.

Sections III and IV.

The majority of the birds in the forty-one pens in these sections were of good quality and colour, but included a few birds which were backward on arrival at the test and slow to come into production. Egg production by this breed was lower than in the previous test; egg size and quality, however, were good and there was a decrease in mortality.

ANY NON-SITTING BREED.

Section V.

The thirteen pens of White Leghorns were of average quality. Individual birds in a few pens were small and defective in type. Egg yield was lower than in the previous test but egg size and quality were up to standard. Mortality was much higher than in the previous test.

ANY OTHER UTILITY BREED.

Section VI.

Fifteen pens of Light Sussex and one pen of Barred Plymouth Rocks comprised this section. The Light Sussex entries were of very good quality, well developed and of good colour. Production reached a satisfactory level and egg size and quality were excellent. Mortality amongst the Light Sussex was low. The Barred Rocks were good specimens but production was disappointing.

CONCLUSION.

The results of the test were fairly satisfactory. During the early months the egg production and health of the birds were most satisfactory but these early standards were not maintained. The egg size and quality were very good but the yield was only average. Mortality, although lower than in the previous test continued high; most of the deaths, however, were due to non-infectious causes.

Table I.

The following Table shows the egg production for each of the thirty-three tests held since 1912-13 :—

Test Period	No. of Birds	No. of Eggs Laid	Average Number per Bird
Forty-eight weeks ended :—			
31st Aug., 1913	318	38,199	120.1
„ 1914	282	39,216	139.0
„ 1915	264	39,764	150.6
„ 1916	294	49,830	169.5
„ 1917	210	36,660	174.6
„ 1918	210	36,106	171.9
„ 1919	306	55,124	180.0
„ 1920	354	65,840	186.0
„ 1921	288	51,584	179.0
9th Sept., 1922	342	63,518	185.7
16th „ 1923	198	38,519	194.5
15th „ 1924	342	61,144	178.8
15th „ 1925	348	63,755	183.2
15th „ 1926	342	65,137	190.4
16th „ 1927	492	93,912	190.9
16th „ 1928	510	95,226	186.7
16th „ 1929	540	101,820	188.6
16th „ 1930	588	100,752	171.3
16th „ 1931	588	111,180	189.1
15th „ 1932	600	111,986	186.6
12th „ 1933	606	113,047	186.5
10th „ 1934	606	112,177	185.1
7th „ 1935	702	131,384	187.1
3rd „ 1936	702	130,940	186.5
Forty-six weeks ended :—			
18th Aug., 1937	708	125,621	177.4
18th „ 1938	678	126,143	186.1
18th „ 1939	708	133,306	188.3
17th „ 1940	672	121,250	180.4
18th „ 1941	642	114,617	178.5
18th „ 1942	438	77,640	177.3
18th „ 1943	510	88,167	172.9
17th „ 1944	546	91,908	168.3
18th „ 1945	546	94,956	173.9

It should be noted that the figures given in Table I above are based on the total number of birds competing, no allowance having been made in respect of deaths.

Taking the birds which died during the 1944-45 test into account only up to the date of death, the average number of birds for the whole period was 527.1 and the average number of eggs per bird 180.1.

Table II.

Average Egg Yield for each Breed.

Breed	Number of Birds for full period	Number of Eggs Laid	Average Number of Eggs per Bird	Grade Averages per Bird		
				Special	First	Under First
White Wyandotte ..	108	21,365	197.8	112.7	70.8	14.3
Rhode Island Red ..	218	40,940	187.8	102.9	74.8	10.1
White Leghorn ..	67	11,787	175.2	91.0	64.6	19.6
Light Sussex	84	14,719	175.2	109.1	58.7	7.4
Barred Rock	6	981	163.5	44.7	96.5	22.3
All Breeds	483	89,742	185.8	103.8	70.0	12.0

Table III.

Average Egg Yield per Bird during each of the Twelve Periods.

Breed	Number of Birds for full period	Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Average for full period
White Wyandotte	108	14.6	17.1	17.5	17.5	16.8	19.1	20.7	19.5	17.9	15.8	14.6	6.7	197.8
Rhode Island Red	218	10.9	14.5	16.7	15.7	14.7	19.3	21.1	20.1	18.6	16.1	14.1	6.0	187.8
White Leghorn ...	67	10.6	11.4	13.9	13.1	13.3	19.4	20.6	19.6	17.6	16.2	14.2	5.3	175.2
Light Sussex ...	84	12.0	14.0	16.8	16.8	16.8	19.3	19.0	17.2	14.4	13.7	11.0	4.7	175.2
Barred Rock ...	6	4.5	3.7	11.2	9.7	11.7	20.6	22.6	21.8	20.3	19.0	14.2	4.2	163.5
All Breeds ...	483	11.8	14.4	16.3	15.9	15.3	19.3	20.6	19.4	17.6	15.7	13.7	5.8	185.8

Table IV.
Average Weight of Egg for each Breed.

Breed	Total Number of Eggs Laid	Total Weight of Eggs	Average Weight of Egg	Average Weight per dozen
		lb. oz. dr.	*oz. dr.*	*oz.*
White Wyandotte ..	23,104	3,211 1 12	2 4	26.7
Rhode Island Red ..	43,142	6,025 4 11	2 4	26.8
White Leghorn ..	12,514	1,721 6 10	2 3	26.4
Light Sussex	15,215	2,147 14 15	2 4	27.1
Barred Rock	981	130 10 5	2 2	25.6
All Breeds ..	94,956	13,236 6 5	2 4	26.8

Table V.
Number and Percentage of Special, First and under First Grade Eggs for each Breed in respect of Birds which completed the full 46-week Period.

Breed	Eggs Laid			Percentage Distribution		
	Special Grade	First Grade	Under First Grade	Special Grade	First Grade	Under First Grade
				%	%	%
White Wyandotte ..	12,177	7,645	1,548	57.0	35.8	7.2
Rhode Island Red ..	22,428	16,311	2,201	54.8	39.8	5.4
White Leghorn ..	6,098	4,324	1,315	52.0	36.8	11.2
Light Sussex	9,162	4,983	624	62.2	33.6	4.2
Barred Rock	268	579	184	27.3	59.0	13.7
All Breeds ..	50,133	33,792	5,817	55.9	37.6	6.5

Table VI.

Number and Percentage of Birds which laid 200 Special and First Grade Eggs or over, and not more than twenty per cent. under First Grade.

Breed	Number of Birds for full Period	Number of Birds which laid 200 Special and First Grade Eggs or over	Percentage
			%
White Wyandotte	108	52	48.1
Rhode Island Red	218	70	32.1
White Leghorn	67	9	13.4
Light Sussex	84	18	21.4
Barred Rock	6	—	—
All Breeds	483	149	30.8

Table VII.

Number and Percentage of Birds which laid over 169 but less than 200 Special and First Grade Eggs and not more than 20 per cent. under First Grade. The figures are based on the number of birds which completed the Test.

Breed	Number of Birds	Percentage
		%
White Wyandotte	16	14.8
Rhode Island Red	64	29.3
White Leghorn	23	34.3
Light Sussex	27	32.1
Barred Rock	2	33.3
All Breeds	132	27.3

Table VIII.

Egg Records of Birds which were awarded Copper Rings.

White Wyandotte (45 Birds).

Pen Number	Bird Number	Number of Sealed Copper Ring	Eggs Laid: Special Grade	First Grade	Under First Grade	Total	Name and Address of Owner
3	13	2630	147	53	4	204	Sister-in-Charge, Residential School of Domestic Science, Dunmanway, Co. Cork.
	14	2631	200	2	—	202	
	15	2632	210	3	—	213	
	17	2633	204	19	—	223	
	18	2634	196	25	—	221	
4	19	2635	223	15	—	238	Mr. V. E. H. Bewley, Danum Firs, Zion Road, Rathgar, Dublin.
	20	2636	204	6	1	211	
	22	2637	238	15	—	253	
6	31	2638	226	4	—	230	Sister-in-Charge, St. Martha's College, An Uaimh, Co. Meath.
	34	2639	203	19	—	222	
7	37	2640	64	162	8	234	Mrs. M. Nagle, Springmount, Mallow, Co. Cork.
	42	2641	13	194	44	251	
8	457	2642	194	52	1	247	Mrs. K. F. Graham, Ballagh Lodge, Donadea, Co. Kildare.
	458	2643	160	65	2	227	
10	49	2644	184	22	8	214	Mrs. C. Monahan, Toor Cottage, Ballinabrackey, Hill-of-Down, Co. Meath.
	54	2646	69	144	21	234	
12	55	2647	193	9	—	202	Mrs. W. Coleman, Banada, Ballaghaderreen, Co. Roscommon.
	56	2648	162	47	1	210	
	58	2649	81	126	8	215	
	60	2650	192	16	1	209	
13	62	2652	189	17	—	206	Mr. W. Barron, Woodview Poultry Farm, Gurtrush, Piltown, Co. Kilkenny.
	64	2653	207	10	2	219	
17	76	2654	30	178	22	230	Mrs. E. Kennedy, Ballyroe, Freshford, Co. Kilkenny.
18	79	2655	112	146	6	264	Mrs. M. Connolly, Carrigamore, Corvally P.O., Co. Monaghan.
	80	2656	89	137	1	227	
	83	2657	169	58	5	232	

Pen Number	Bird Number	Number of Sealed Copper Ring	Eggs Laid: Special Grade	First Grade	Under First Grade	Total	Name and Address of Owner
19	85	2658	223	23	1	247	Sister-in-Charge, Rural Domestic Economy School, Swinford, Co. Mayo.
	87	2659	129	79	1	209	
	88	2660	210	3	2	215	
	89	2661	256	3	—	259	
	90	2662	215	12	—	227	
20	91	2663	77	134	10	221	Mrs. E. Hillis, Corrush, Doohamlet, Castleblayney, Co. Monaghan.
	92	2664	18	198	46	262	
	93	2665	226	22	--	248	
	96	2666	70	135	16	221	
22	103	2667	180	25	7	212	Mrs. B. Coughlan, Ruane, Eyrecourt, Ballinasloe, Co. Galway.
	106	2668	80	158	15	253	
	108	2669	21	180	14	215	
23	109	2670	234	34	—	268	Mrs. K. Ryan, Farnane, Lisnagry, Co. Limerick.
	111	2671	54	178	12	244	
	113	2672	240	3	1	244	
24	463	2673	87	148	12	247	Mrs. K. F. Graham, Ballagh Lodge, Donadea, Co. Kildare.
	465	2674	49	157	6	212	
	467	2675	107	108	4	219	
	468	2676	72	128	4	204	

Rhode Island Red (64 Birds).

Pen Number	Bird Number	Number of Sealed Copper Ring	Eggs Laid: Special Grade	First Grade	Under First Grade	Total	Name and Address of Owner
25	120	2677	197	13	1	211	Lady M. Athlumney, Somerville, Balrath, Co. Meath.
29	140	2678	175	32	1	208	Mr. M. Fitzgibbon, Gurrane, Kilmeedy, Co. Limerick.
	144	2679	116	109	1	226	
30	149	2680	181	23	2	206	Miss M. O'Donovan, Dromore, Villierstown, Cappoquin, Co. Waterford.
	150	2681	212	—	-	212	
32	151	2682	25	213	34	272	Mr. D. H. Edwards, Drumgowan, Speenogue P.O., Burt, Co. Donegal.
	155	2683	38	166	4	208	
	156	2684	169	41	1	211	

Pen Number	Bird Number	Number of Sealed Copper Ring	Eggs Laid: Special Grade	Eggs Laid: First Grade	Eggs Laid: Under First Grade	Eggs Laid: Total	Name and Address of Owner
33	157	2685	68	144	5	217	Mrs. K. Earl, Grantstown House, Waterford.
36	175	2686	81	119	10	210	Miss A. M. Dempster, Emo Park, Portarlington, Laoighis.
37	182 183 185	2687 2688 2689	58 73 223	149 157 24	7 4 —	214 234 247	Mrs. B. McAuliffe, Farrihy, Broadford, Charleville, (Co. Limerick).
38	187	2690	154	50	1	205	Mr. M. McCarthy, Caherelly Castle, Grange, Kilmallock, Co. Limerick.
40	200 202	2691 2692	82 63	144 199	5 2	231 264	Mrs. E. O'Donnell, Kilbreedy West, Kilmallock, Co. Limerick.
41	206	2693	103	129	3	235	Miss J. Weston, Ballymadrough, Donabate, Co. Dublin.
42	212 213 214	2694 2695 2696	155 243 171	78 18 70	4 — —	237 261 241	Mrs. K. Cuddihy, Hillside Poultry Farm, Glenmore, Co. Kilkenny.
43	469	2697	115	114	10	239	Mrs. L. Farrell, Stanley Lodge, Cashel, Co. Tipperary.
44	223 226	2698 2699	154 157	101 55	7 1	262 213	Mrs. M. Browne, Ballybane, Firies, Co. Kerry.
45	217 219 222	2700 2701 2702	49 149 178	195 74 55	12 1 3	256 224 236	Mrs. C. Healy, Clonmeen, Banteer, Co. Cork.
62	229 230 231 233	2703 2704 2705 2706	41 9 57 167	192 193 160 41	10 31 1 1	243 233 218 209	E. Bean Mhic Dhomhnaill, Imeall- Atha, Baile an Fheirteirigh, Co. Chiarraidhe.
64	181	2707	185	78	—	263	Mrs. K. Sammon, Carrigahorig, Lorrha, Birr, Offaly.

Pen Number	Bird Number	Number of Sealed Copper Ring	Eggs Laid				Name and Address of Owner
			Special Grade	First Grade	Under First Grade	Total	
65	241 245 246	2708 2709 2710	108 194 126	129 32 122	1 1 —	238 227 248	Miss M. O'Donovan, Dromore, Villierstown, Cappoquin, Co. Waterford.
66	247 249 251	2711 2712 2713	83 115 154	123 107 94	3 1 —	209 223 248	Mr. D. H. Edwards, Drumgowan, Speenogue P.O., Burt, Co. Donegal.
67	254	2714	104	97	3	204	Mrs. D. Philpott, Charlesfield, Banteer, Co. Cork.
69	267 268 269 270	2715 2716 2717 2718	74 89 161 195	175 111 43 7	11 16 3 —	260 216 207 202	Mrs. R. Cochrane, Springlawn, Tullyroe, Roscommon.
70	272	2719	221	5	—	226	Mrs. B. McAuliffe, Farrihy, Broadford, Charleville, (Co. Limerick.)
73	283 285 287 288	2720 2721 2722 2723	192 78 175 106	23 169 29 115	1 6 — 3	216 248 204 224	Mrs. D. Heafey, Coolmore, Thomastown, Co. Kilkenny.
74	290	2724	195	28	—	223	Mrs. M. C. McCormack, Bawnogues Poultry Farm, Kilcock, Co. Kildare.
75	296	2725	202	32	3	237	Mrs. E. Hammersley, Ashvale, Lattin, Tipperary.
77	439 440	2726 2727	162 160	61 40	7 2	230 202	Miss J. Weston, Ballymadrough, Donabate, Co. Dublin.
78	318	2728	206	8	2	216	Mrs. E. Wilson, Guilcagh, Portlaw, Co. Waterford.
79	320	2729	167	73	2	242	Miss M. Mulcahy, Abbeyview, Clonmel, (Co. Waterford.)
80	325 328 329 330	2730 2731 2732 2733	121 23 106 29	92 181 105 204	3 51 1 13	216 255 212 246	Mrs. B. M. Rafter, Knockthomas, Bagenalstown, Co. Carlow.

Pen Number	Bird Number	Number of Sealed Copper Ring	Eggs Laid: Special Grade	First Grade	Under First Grade	Total	Name and Address of Owner
81	333 334 335	2734 2735 2736	13 52 64	230 198 166	32 14 11	275 264 241	Mrs. M. A. Kelly, Carranstown, Ballivor, Co. Meath.
82	340	2737	143	72	4	219	Miss C. Mealiff, Ballinamona House, Tullamore, Offaly.
84	343 347 348	2738 2739 2740	220 37 33	15 171 187	1 7 8	236 215 228	Mrs. L. Hayes, Walshestown, Castlemahon, Newcastle-West, Co. Limerick.

White Leghorn (7 Birds).

Pen Number	Bird Number	Number of Sealed Copper Ring	Eggs Laid: Special Grade	First Grade	Under First Grade	Total	Name and Address of Owner
85	543	1831	186	14	—	200	Mrs. M. O'Shea, Furrantane, Castlegregory, Co. Kerry.
86	547 551	1832 1833	197 38	3 167	— 8	200 213	Mr. M. Fitzgibbon, Gurrane, Kilmeedy, Co. Limerick.
90	575	1834	95	115	3	213	Miss A. M. Dempster, Emo Park, Portarlington, Laoighis.
91	577	1835	180	33	—	213	Mrs. A. Collins, Imanemore, Barnaderg, Ballyglunin, Co. Galway.
95	602	1836	116	89	1	206	Sister-in-Charge, St. Martha's College, An Uaimh, Co. Meath.
100	616	1837	56	146	11	213	Mrs. M. E. Shanley, Drumard, Dromod, Co. Leitrim.

Light Sussex (18 Birds).

Pen Number	Bird Number	Number of Sealed Copper Ring	Eggs Laid: Special Grade	Eggs Laid: First Grade	Eggs Laid: Under First Grade	Eggs Laid: Total	Name and Address of Owner
102	855 858	2741 2742	171 205	69 —	2 —	242 205	Mrs. M. Comerford, Lamogue, Windgap, Co. Kilkenny.
104	371	2743	171	47	1	219	Sister-in-Charge, Residential School of Domestic Science, Dunmanway, Co. Cork.
105	378	2744	153	49	—	202	Miss B. Roche, Cleariestown, Co. Wexford.
106	380 384	2745 2746	45 188	171 28	8 —	224 216	Mrs. J. Hely-Hutchinson, Lissen Hall, Swords, Co. Dublin.
108	349	2747	153	62	—	215	Mrs. W. O'Neill, Killeen House, Ballybricken, Grange, Co. Limerick.
109	397	2748	27	198	30	255	Miss C. Rourke, Clonaheenogue, Lusmagh, Banagher, Offaly.
110	403 404 405 407	2749 2750 2751 2752	181 168 86 133	41 52 115 68	2 3 20 6	224 223 221 207	Mrs. A. Quilty, Nicholastown, Mooncoin, Co. Kilkenny.
112	417 419	2753 2754	196 107	9 103	— 9	205 219	Sister-in-Charge, St. Martha's College, An Uaimh, Co. Meath.
114	429	2755	166	39	2	207	Mrs. M. Nagle, Springmount, Mallow, Co. Cork.
115	446	2756	191	11	—	202	Mrs. K. Cuddihy, Hillside Poultry Farm, Glenmore, Co. Kilkenny.
116	483 486	2757 2758	187 209	41 23	1 —	229 232	Sister-in-Charge, St. Mary's Abbey, Glencairn, Co. Waterford.

TABLE IX.

Results of post-mortem examinations performed by the Veterinary College.

Date of Death	Number of Bird	Number of Pen	Breed	Result of Post-mortem Examination
1944				
Dec. 4	98	21	White Wyandotte	Peritonitis and oviductitis.
,, 7	568	89	White Leghorn	Neuro-lymphomatosis.
1945				
Jan. 16	188	28	Rhode Island Red	Caecal coccidiosis and capillaria worm infestation.
Feb. 7	191	38	Rhode Island Red	Peritonitis.
,, 14	398	109	Light Sussex	Tuberculosis.
,, 15	341	82	Rhode Island Red	Peritonitis.
, 19	181	37	Rhode Island Red	Oviductitis.
,, 20	86	19	White Wyandotte	Peritonitis.
,, 24	5	1	White Wyandotte	Inflammation of the heart.
Mar. 5	1	1	White Wyandotte	Nephritis.
,, 12	260	68	Rhode Island Red	Tuberculosis.
,, 14	10	2	White Wyandotte	Inflammation of the bowel.
,, 14	68	261	Rhode Island Red	Neuro-lymphomatosis.
,, 22	7	2	White Wyandotte	Nephritis.
,, 28	3	1	White Wyandotte	Inflammation of the bowel.
,, 31	396	101	Rhode Island Red	Tuberculosis.
April 12	548	86	White Leghorn	Congestion of the lungs.
,, 13	400	109	Light Sussex	Tuberculosis.
,, 17	392	101	Rhode Island Red	Tuberculosis.
,, 17	565	89	White Leghorn	General debility.
,, 20	402	109	Light Sussex	Tuberculosis.
,, 26	63	13	White Wyandotte	Peritonitis and oviductitis.
,, 30	266	69	Rhode Island Red	Tuberculosis.
May 2	6	1	White Wyandotte	General debility.
,, 2	196	39	Rhode Island Red	Peritonitis and oviductitis.
,, 2	375	105	Light Sussex	Peritonitis and oviductitis.
,, 5	390	107	Light Sussex	Tuberculosis.
,, 14	118	25	Rhode Island Red	Peritonitis and oviductitis.
,, 14	255	67	Rhode Island Red	Coccidiosis.
,, 14	583	92	White Leghorn	Chronic peritonitis.
,, 15	256	67	Rhode Island Red	Ulceration of the bowel.
,, 15	566	89	White Leghorn	Rupture of a fatty liver.
,, 16	546	85	White Leghorn	Peritonitis.
,, 23	9	2	White Wyandotte	Peritonitis.
,, 23	172	35	Rhode Island Red	Blood tumours in liver.
,, 25	542	85	White Leghorn	Peritonitis.
,, 28	252	66	Rhode Island Red	Visceral gout.
,, 30	258	67	Rhode Island Red	Coccidiosis.
June 4	133	28	Rhode Island Red	Roup.
,, 4	395	101	Rhode Island Red	Tuberculosis.
,, 5	586	92	White Leghorn	Peritonitis.
,, 6	448	77	Rhode Island Red	Peritonitis and oviductitis.
,, 13	39	7	White Wyandotte	Peritonitis.
,, 28	278	70	Rhode Island Red	Peritonitis and oviductitis.
July 2	197	39	Rhode Island Red	Pericarditis.
,, 3	11	2	White Wyandotte	Tapeworm infestation.
,, 5	21	4	White Wyandotte	Peritonitis.
,, 10	595	94	White Leghorn	Peritonitis.
,, 11	59	12	White Wyandotte	Peritonitis.
,, 16	94	20	White Wyandotte	Lymphomatosis of the ovaries and kidneys.
,, 19	228	44	Rhode Island Red	Peritonitis and oviductitis.

TABLE IX.—*continued.*

Date of Death	Number of Bird	Number of Pen	Breed	Result of Post-mortem Examination
July 21	394	101	Rhode Island Red	Tuberculosis.
,, 27	162	33	Rhode Island Red	Nephritis.
,, 28	163	34	Rhode Island Red	Peritonitis.
,, 30	549	86	White Leghorn	Peritonitis.
,, 31	73	17	White Wyandotte	Peritonitis.
Aug. 1	304	76	Rhode Island Red	Heart disease and cirrhosis of the liver.
,, 6	393	101	Rhode Island Red	Tuberculosis.
,, 6	584	92	White Leghorn	Peritonitis.
,, 7	33	6	White Wyandotte	Peritonitis.
,, 11	65	13	White Wyandotte	Peritonitis.
,, 16	117	25	Rhode Island Red	Constriction of the proventriculus.
,, 16	377	105	Light Sussex	Fatty liver.

Table X.

Number and Percentage of Deaths for each Breed.

Breed	Number of Birds Penned	Number of Deaths	Percentage of Deaths
			%
White Wyandotte	126	18	14.3
Rhode Island Red	246	28	11.4
White Leghorn	78	11	14.1
Light Sussex	90	6	6.7
Barred Rock	6	—	—
All Breeds	546	63	11.5

SECTION PRIZES.

Section I—White Wyandotte.

	Owner of Pen	Scoring Points	Special and First Grade Scoring Eggs
First Prize (£10) :	Sister-in-Charge, School of Domestic Science, Dunmanway, Co. Cork.	2,871	1,210
Second Prize (£7) :	Mrs. K. F. Graham, Ballagh Lodge, Donadea, Co. Kildare.	2,779	1,141
Third Prize (£5) :	Sister-in-Charge, St. Martha's College, An Uaimh, Co. Meath.	2,664	1,098
Fourth Prize (£4) :	Mr. V. E. H. Bewley, Danum Firs, Zion Road, Rathgar, Dublin.	2,423	1,014

Section II—White Wyandotte (Station Holders).

	Owner of Pen	Scoring Points	Special and First Grade Scoring Eggs
First Prize (£10) :	Mrs. M. Connolly, Carrigamore, Corvally P.O., Co. Monaghan.	3,366	1,360
Second Prize (£7) :	Mrs. K. Ryan, Farnane, Lisnagry, Co. Limerick.	2,991	1,243
Third Prize (£5) :	Mrs. W. Coleman, Banada, Ballaghaderreen, Co. Roscommon.	2,981	1,219
Fourth Prize (£4) :	Sister-in-Charge, Rural Domestic Economy School, Swinford, Co. Mayo.	2,864	1,173
Fifth Prize (£2) :	Mrs. E. Hillis, Corrush, Doohamlet, Castleblayney, Co. Monaghan.	2,769	1,130

Section III—Rhode Island Red.

	Owner of Pen	Scoring Points	Special and First Grade Scoring Eggs
First Prize (£10) :	Mrs. K. Cuddihy, Hillside Poultry Farm, Glenmore, Co. Kilkenny.	3,093	1,270
Second Prize (£7) :	Miss J. Weston, Ballymadrough, Donabate, Co. Dublin.	2,625	1,075
Third Prize (£5) :	Mrs. E. O'Donnell, Kilbreedy West, Kilmallock, Co. Limerick.	2,595	1,079
Fourth Prize (£4) :	Mrs. B. McAuliffe, Farriby, Broadford, Charleville, (Co. Limerick.)	2,558	1,048
Fifth Prize (£2) :	Mrs. K. Earl, Grantstown House, Waterford.	2,519	1,041

Section IV—Rhode Island Red (Station Holders).

	Owner of Pen	Scoring Points	Special and First Grade Scoring Eggs
First Prize (£10) :	Mrs. C. Healy, Clonmeen, Banteer, Co. Cork.	3,083	1,268
Second Prize (£7) :	Mr. D. H. Edwards, Drumgowan, Speenogue P.O., Burt, Co. Donegal.	2,922	1,198
Third Prize (£5) :	Mrs. B. M. Rafter, Knockthomas, Bagenalstown, Co. Carlow.	2,922	1,207
Fourth Prize (£4) :	Miss M. O'Donovan, Dromore, Villierstown, Cappoquin, Co. Waterford.	2,869	1,182
Fifth Prize (£2) :	Mrs. D. Heafey, Coolmore, Thomastown, Co. Kilkenny.	2,840	1,175

Section V—Any Non-Sitting Breed.

	Owner of Pen	Breed	Scoring Points	Special and First Grade Scoring Eggs
First Prize (£10) :	Mrs. M. E. Shanley, Drumard, Dromod, Co. Leitrim.	White Leghorn	2,661	1,092
Second Prize (£7) :	Mrs. W. Byrne, Kilcar, Curraghboy, Athlone, Co. Roscommon.	do.	2,555	1,064
Third Prize (£5) :	Mrs. B. Comack, Clooneenblakeney, Strokestown, Co. Roscommon.	do.	2,445	1,019
Fourth Prize (£4) :	Sister-in-Charge, St. Martha's College, An Uaimh, Co. Meath.	do.	2,489	1,016
Fifth Prize (2) :	Mrs. M. Hanly, Cooga, Doon, Co. Limerick.	do.	2,389	959

SECTION VI—ANY OTHER UTILITY BREED.

	Owner of Pen	Breed	Scoring Points	Special and First Grade Scoring Eggs
First Prize (£10) :	Mrs. A. Quilty, Nicholastown, Mooncoin, Co. Kilkenny.	Light Sussex	2,958	1,202
Second Prize (£7) :	Sister-in-Charge, St. Mary's Abbey, Glencairn, Co. Waterford.	do.	2,762	1,130
Third Prize (£5) :	Mrs. M. Comerford, Lamogue, Windgap, Co. Kilkenny.	do.	2,592	1,057
Fourth Prize (£4) :	Sister-in-Charge, St. Martha's College. An Uaimh, Co. Meath.	do.	2,468	1,047
Fifth Prize (£2) :	Sister-in-Charge, Residential School of Domestic Science, Dunmanway, Co. Cork.	do.	2,364	988

SPECIAL PRIZES.

The Special Prize of a Silver Cup (or its value, £10) for the *Pen* of birds scoring the highest number of points during the Test has been awarded to Mrs. M. Connolly, Carrigamore, Corvally P.O., Co. Monaghan, for Pen No. 18 (White Wyandotte) which scored 3,366 points.

Special Prizes of £2 each have been awarded to the following owners :—

1. Mrs. M. Connolly, Carrigamore, Corvally P.O., Co. Monaghan, for the sitting breed, Pen No. 18 (White Wyandotte) which scored 1,131 points during the period 1st October to 23rd December.

2. Mrs. M. E. Shanley, Drumard, Dromod, Co. Leitrim, for the non-sitting breed, Pen No. 100 (White Leghorn) which scored 864 points during the period 1st October to 23rd December.

3. Mrs. B. McAuliffe, Farrihy, Broadford, Charleville, (Co. Limerick,) for the *individual* sitting breed bird, No. 185 (Pen No. 37, Rhode Island Red) which scored 225 points during the period 1st October to 23rd December.

4. Sister-in-Charge, St Martha's College, An Uaimh, Co. Meath, for the *individual* non-sitting breed bird, No. 602 (Pen No. 95, White Leghorn) which scored 162 points during the period 1st October to 23rd December.

5. Mrs. K. Ryan, Farnane, Lisnagry, Co. Limerick, for the *individual* sitting breed bird, No. 109 (Pen No. 23, White Wyandotte) which scored 658 points during the test.

6. Mrs. A. Collins, Imanemore, Barnaderg, Ballyglunin, Co. Galway, for the *individual* non-sitting breed bird, No. 577 (Pen No. 91, White Leghorn) which scored 527 points during the test.

SECTION I.—WHITE WYANDOTTE—8 Pens.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1944	No. of Bird	Weight: On Arrival lb. oz.	Weight: At Close of Test lb. oz.	Production per Period: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First-Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs oz dr.	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
1	3	Sister-in-Charge,	March 1	13	5 1	6 2	13	—	5	22	21	25	23	24	19	19	23	10	204	147	53	4	—	14	42	466	2 4	—	(a) 1,218 Eggs
		School of Dom. Science,	Feb. 17	14	5 0	6 4	—	20	22	22	19	21	23	22	21	22	7	3	202	200	2	—	2	42	123	472	2 7	—	
		Dunmanway,	" 1	15	5 0	7 2	—	9	21	21	21	22	21	23	22	22	21	10	213	210	3	—	—	30	90	509	2 7	—	(b) 28.3 oz.
		Co. Cork.	"	16	5 5	6 12	—	16	21	21	20	19	19	21	15	3	—	—	155	150	4	1	—	36	108	347	2 6	—	
			"	17	5 6	5 8	24	22	18	21	22	25	17	22	22	12	15	3	223	204	19	—	—	64	192	540	2 5	—	(c) 2,871 Points
			March 18	18	4 12	6 4	8	21	21	20	20	17	21	23	22	21	19	8	221	196	25	—	1	50	147	537	2 5	—	
2	8	Mrs. K. F. Graham,	Mar. 14	457	4 8	5 12	22	22	21	20	21	21	23	24	24	23	18	8	247	194	52	1	—	64	192	605	2 5	—	(a) 1,191 Eggs
		Ballagh Lodge,	Feb. 16	458	5 1	6 0	23	22	21	20	18	21	22	19	16	17	22	6	227	160	65	2	1	65	195	556	2 5	1	
		Donadea,	"	459	4 8	5 4	24	23	23	20	22	23	22	20	15	15	16	8	231	112	87	32	10	38	114	449	2 3	—	(b) 27.4 oz.
		Co. Kildare.	Mar. 14	460	5 4	6 7	19	18	18	17	18	18	24	23	23	17	—	4	199	148	50	1	3	55	165	463	2 5	1	
			Feb. 16	461	5 7	6 14	21	18	7	—	—	1	21	17	21	13	12	12	143	137	6	—	—	46	138	369	2 6	1	(c) 2,779 Points
			Mar. 14	462	4 15	6 4	—	6	10	20	12	17	22	8	16	12	5	7	144	136	8	—	—	25	75	337	2 6	1	
3	6	Sister-in-Charge,	Jan. 29	31	5 8	5 14	21	21	17	18	19	20	21	23	18	19	22	11	230	226	4	—	10	59	177	542	2 8	—	(a) 1,128 Eggs
		St. Martha's College,	Jan. 6	32	5 0	6 0	—	4	18	16	21	19	22	20	21	21	22	8	192	189	3	—	3	22	66	449	2 9	—	
		An Uaimh,	"	33	4 12	D	21	21	16	11	12	9	13	15	6	—	—	D	124	112	12	—	—	58	174	306	2 5	—	(b) 28.3 oz.
		Co. Meath.	Jan. 29	34	5 0	5 10	15	19	21	19	21	18	19	19	21	20	21	9	222	203	19	—	—	55	165	549	2 5	—	
			Jan. 6	35	4 8	5 0	—	—	5	18	6	18	23	22	24	22	20	10	168	28	124	16	1	5	15	347	2 2	—	(c) 2,664 Points
			"	36	4 10	5 0	19	21	12	10	15	20	20	21	19	19	7	9	192	146	46	—	—	52	156	471	2 4	—	
4	4	Mr. V. E. H. Bewley	Feb. 10	19	6 4	7 2	20	22	21	19	17	21	23	23	21	20	21	10	238	223	15	—	2	63	189	585	2 6	—	(a) 1,062 Eggs
		Danum Firs,	Mar. 7	20	6 4	6 12	—	—	11	23	20	21	25	26	27	26	22	10	211	204	6	1	—	10	30	488	2 6	—	
		Zion Road,	Feb. 28	21	6 0	D	1	6	19	8	5	23	13	3	—	D1	-	—	79	75	4	—	3	26	78	178	2 9	—	(b) 27. 8 oz.
		Rathgar,	Mar. 7	22	5 2	5 2	23	25	23	19	20	21	24	25	21	21	22	9	253	238	15	—	—	71	213	629	2 6	—	
		Dublin.	" 23	23	4 10	7 3	—	3	18	20	20	23	15	—	—	—	5	1	105	84	21	—	4	21	63	227	2 5	—	(c) 2,423 Po'nts
			" 9	24	6 0	6 2	20	24	22	12	17	21	20	9	21	2	7	1	176	24	116	36	2	33	99	316	2 1	1	
*	7	Mrs. M. Nagle,	Feb 10	37	4 12	5 4	17	21	19	22	21	21	19	23	22	17	22	10	234	64	162	8	—	53	159	552	2 2	—	(a) 1,195 Eggs
		Springmount,	"	38	5 1	5 8	23	23	18	21	22	22	20	21	11	10	19	11	221	53	104	64	—	13	39	363	2 1	—	
		Mallow,	"	39	5 0	D	20	5	26	22	20	20	14	15	—	D	—	—	142	10	93	39	—	22	66	228	2 0	1	(b) 24.5 oz.
		Co. Cork.	"	40	4 14	3 0	19	20	20	13	16	21	15	2	7	—	—	—	133	12	101	20	1	54	162	278	2 1	—	
			"	41	4 10	5 8	22	21	16	19	18	4	17	24	20	23	20	10	214	2	79	133	—	22	66	203	1 15	—	(c) 2,083 Points
			"	42	4 9	5 2	23	23	22	21	22	22	26	24	24	21	16	7	251	13	194	44	6	40	120	459	2 1	—	

*Pen produced more than 20 per cent. of eggs under first grade. D = Dead.

SECTION I.—WHITE WYANDOTTE—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1944	No. of Bird	Weight: On Arrival (lb. oz.)	Weight: At Close of Test (lb. oz.)	Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First-Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Scoring Points: Full Period	Average Weight of Eggs (oz. dr.)	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. c) Scoring Points per Pen.
5	5	Mr. V. B. H. Bewley,	Feb. 28	25	5 0	6 6	—	—	16	23	24	28	22	19	22	18	18	10	195	137	55	3	1	13	39	440	2 5	—	(a) 945 Eggs
		Danum Firs,	Mar. 23	26	4 10	5 10	14	24	12	18	17	13	15	10	14	12	14	4	167	62	77	28	5	27	81	324	2 3	—	
		Zion Road,	"	27	4 10	5 12	—	16	20	9	2	21	23	22	22	26	20	8	189	167	21	1	18	35	105	422	2 5	—	(b) 26.6 oz.
		Rathgar,	"	28	4 9	5 12	—	—	13	21	20	11	22	23	18	—	17	9	154	15	101	38	24	11	33	209	2 1	—	
		Dublin.	April 15	29	4 8	6 2	—	—	23	22	26	25	15	19	14	13	9	11	177	28	122	27	26	7	21	283	2 1	1	(c) 1,806 Points
			" 3	30	4 8	6 10	—	—	1	—	5	17	10	7	4	8	5	6	63	54	7	2	5	—	—	128	2 8	—	
6	1	Mrs. M. Stanton,	Feb. 25	1	6 9	D	17	19	15	7	—	D3	—	—	—	—	—	—	61	31	27	3	—	48	144	164	2 2	—	(a) 673 Eggs
		Woodlands,	" "	2	6 4	7 2	15	9	1	15	19	16	20	20	20	15	16	2	168	123	42	3	4	22	66	375	2 4	—	
		Glanmire,	" 28	3	6 0	D	25	23	23	22	19	5	D	—	—	—	—	—	117	5	82	30	—	43	129	217	2 0	—	(b) 25.1 oz.
		Co. Cork.	" "	4	5 14	5 6	25	18	19	17	13	14	12	9	12	4	9	—	152	20	118	14	8	50	147	319	2 1	—	
			" 25	5	6 8	D	17	19	11	20	8	D	—	—	—	—	—	—	75	1	57	17	—	31	93	147	2 0	—	(c) 1,367 Points
			" "	6	6 0	D	22	16	18	16	5	17	6	D	—	—	—	—	100	1	59	40	—	25	75	145	2 0	—	
7	2	Mrs. M. Stanton,	Feb. 25	7	7 9	D	7	5	9	9	2	—	D	—	—	—	—	—	32	—	18	14	—	10	30	46	1 15	—	(a) 486 Eggs
		Woodlands,	"	8	7 6	8 12	19	12	15	16	16	18	20	20	18	9	—	—	163	158	4	1	1	45	135	376	2 6	—	
		Glanmire,	Feb. 28	9	6 8	D	22	18	22	17	10	4	2	2	D	—	—	—	97	55	40	2	1	62	186	250	2 8	—	(b) 26.9 oz.
		Co. Cork.	"	10	6 12	D	14	12	14	6	2	D	—	—	—	—	—	—	48	5	34	9	—	31	93	109	2 0	—	
			Feb. 25	11	6 13	D	12	3	12	3	6	7	14	6	7	D5	—	—	75	2	54	19	37	8	15	43	1 15	—	(c) 984 Points
			"	12	7 8	3 12	19	9	8	10	—	1	13	11	—	—	—	—	71	70	—	1	8	36	108	160	2 8	—	

D = Dead.

SECTION II.—WHITE WYANDOTTE (STATION HOLDERS)—13 Pens.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1944	No. of Bird	Weight: On Arrival (lb. oz.)	Weight: At Close of Test (lb. oz.)	Production per Period: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs (oz dr)	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
1	18	Mrs. M. Connolly,	February	79	5 14	6 12	18	23	20	24	21	24	25	27	25	21	24	12	264	112	146	6	1	57	171	628	2 3	—	(a) 1,405 Eggs
		Carrigamore,	,,	80	5 0	5 0	24	21	23	23	19	17	24	18	19	19	16	4	227	89	137	1	2	68	204	553	2 3	—	
		Corvally P.O.,	,,	81	5 1	6 6	22	26	26	21	23	19	23	27	18	14	12	10	241	107	126	8	1	69	207	568	2 3	2	(b) 26.1 oz.
		Co. Monaghan.	,,	82	5 8	5 12	23	22	23	23	19	25	24	22	21	25	21	7	255	88	167	—	1	68	204	628	2 3	—	
			,,	83	5 12	6 8	17	20	21	21	19	21	23	15	22	22	21	10	232	169	58	5	—	55	165	562	2 4	—	(c) 3,366 Points
			,,	84	5 0	5 12	25	24	20	—	—	20	27	14	17	18	10	11	186	45	121	20	—	60	180	427	2 2	2	
2	23	Mrs. K. Ryan,	Feb. 1	109	4 14	5 6	11	25	22	20	24	24	27	28	28	26	23	10	268	234	34	—	-	58	174	653	2 5	—	(a) 1,283 Eggs
		Farnane,	,,	110	5 0	7 3	7	23	19	19	22	21	20	20	15	12	12	5	195	178	16	1	4	48	144	453	2 5	—	
		Lisnagry,	,,	111	4 9	5 8	10	19	23	19	21	25	24	24	24	23	23	9	244	54	178	12	-	51	153	564	2 2	—	(b) 27.4 oz.
		Co. Limerick.	,,	112	4 13	6 8	—	5	27	25	26	25	22	13	15	14	11	4	187	25	141	21	1	30	90	388	2 2	—	
			,,	113	4 12	5 12	18	19	19	21	17	24	24	23	25	23	21	10	244	240	3	1	—	55	165	595	2 8	—	(c) 2,991 Points
			,,	114	5 1	6 0	—	—	16	18	14	17	14	18	16	17	14	1	145	123	22	—	—	16	48	338	2 5	—	
3	12	Mrs. W. Coleman,	Jan. 5	55	4 12	5 6	20	22	21	18	21	20	21	23	10	9	17	—	202	193	9	—	1	63	189	490	2 6	1	(a) 1,237 Eggs
		Banada,	,,	56	5 0	7 0	15	22	18	20	19	19	22	19	19	18	13	6	210	162	47	1	2	54	162	503	2 4	—	
		Ballaghaderreen,	Jan. 13	57	5 7	6 2	25	24	22	21	21	21	22	25	18	17	16	8	240	170	69	1	3	71	213	582	2 4	–	(b) 27.2 oz.
		Co. Roscommon.	Jan. 27	58	5 7	6 8	22	22	22	20	16	18	20	23	18	3	21	10	215	81	126	8	1	61	183	505	2 3	—	
			Jan. 13	59	5 0	D	20	21	14	18	15	20	20	18	14	1	D	—	161	123	38	—	—	55	165	378	2 5	—	(c) 2,981 Points
			,,	60	5 6	6 6	21	20	17	15	16	17	24	21	9	22	19	8	209	192	16	1	—	58	174	523	2 5	—	
4	19	Sister-in-Charge,	Mar. 1	85	4 12	6 9	3	26	23	23	23	23	26	23	23	23	21	10	247	223	23	1	—	51	153	597	2 5	—	(a) 1,208 Eggs
		Rural Domestic Economy School,	Feb. 15	86	5 2	D	7	20	10	10	2	D2	—	—	—	—	—	—	51	17	30	4	25	33	66	66	1 12	—	
		Swinford,	Mar. 1	87	4 9	5 9	—	—	18	19	21	23	26	27	22	21	22	10	209	129	79	1	2	17	51	480	2 4	—	(b) 28.0 oz.
		Co. Mayo.	Feb. 15	88	4 8	5 12	16	21	16	19	20	7	23	24	21	20	19	9	215	210	3	2	—	52	156	526	2 7	—	
			,,	89	4 9	6 6	16	24	23	21	23	23	24	27	23	22	23	10	259	256	3	—	—	63	189	636	2 8	—	(c) 2,864 Points
			Mar. 1	90	4 12	5 6	14	21	17	17	17	21	22	20	25	22	20	11	227	215	12	—	—	52	156	559	2 6	—	
5	20	Mrs. E. Hillis,	Jan. 27	91	5 1	6 0	27	10	23	25	21	14	26	13	22	16	15	9	221	77	134	10	—	57	171	513	2 3	3	(a) 1,220 Eggs
		Corrush,	,,	92	5 1	5 12	23	28	23	16	25	23	24	27	22	21	17	13	262	18	198	46	1	60	180	528	2 1	—	
		Doohamlet,	,,	93	6 14	7 10	20	24	18	20	20	20	24	27	22	23	21	9	248	226	22	—	1	62	186	608	2 6	–	(b) 26.9 oz.
		Castleblayney,	,,	94	5 10	D	10	14	8	—	4	16	20	18	6	—	D	—	96	77	16	3	3	32	93	211	2 4	—	
		Co. Monaghan.	,,	95	6 14	8 1	5	12	10	—	2	19	25	25	22	24	19	9	172	165	7	—	6	27	81	409	2 9	—	(c) 2,769 Points
			,,	96	4 8	5 0	20	22	23	15	15	18	26	18	21	21	17	5	221	70	135	16	4	58	171	500	2 2	—	

D = Dead.

SECTION II.—WHITE WYANDOTTE (STATION HOLDERS)—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1944	No. of Bird	Weight: On Arrival lb. oz.	Weight: At Close of Test lb. oz.	Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	Grading: First Grade	Grading: Under First Grade	Grading: Non-Scoring, Special and First Grade	Grading: Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Scoring Points: Full Period	Average Weight of Eggs oz. dr.	Number of times Broody	(a) Total Eggs from Pen (b) Average Weight per dozen. (c) Scoring Points per Pen.
6	24	Mrs. K. F. Graham,	Feb. 16	463	5 0	5 9	24	23	22	18	20	22	24	21	23	19	22	9	247	87	148	12	—	57	171	577	2 3	—	(a) 1,155 Eggs
		Ballagh Lodge,	„	464	4 9	6 4	6	—	—	—	16	21	17	19	21	8	—	1	109	17	82	10	1	4	12	206	2 2	—	
		Donadea,	„	465	5 6	6 12	19	17	18	18	17	20	20	22	18	17	17	9	212	49	157	6	1	50	147	502	2 2	—	(b) 26.1 oz.
		Co. Kildare.	Mar. 14	466	4 14	5 12	15	18	20	19	14	17	16	11	7	13	12	2	164	135	29	—	4	53	156	399	2 5	—	
			Feb. 16	467	5 4	5 14	22	22	22	19	19	21	20	17	20	10	18	9	219	107	108	4	—	63	189	530	2 3	1	(c) 2,707 Points
			„	468	5 6	5 12	19	23	24	21	18	19	16	19	11	13	12	9	204	72	128	4	2	65	195	493	2 3	2	
7	17	Mrs. E. Kennedy,	February	73	4 14	D	24	24	23	23	22	23	22	18	—	—	D	—	179	60	112	7	—	70	210	414	2 2	—	(a) 1,177 Eggs
		Ballyroe,	„	74	4 14	5 12	23	22	22	24	22	24	26	23	20	19	21	11	257	132	112	13	1	67	201	601	2 3	1	
		Freshford,	„	75	5 0	4 6	19	19	19	20	19	22	22	22	19	19	17	6	223	35	160	28	—	55	165	473	2 1	—	(b) 25.7 oz.
		Co. Kilkenny.	„	76	4 12	5 4	19	25	9	21	20	22	23	25	18	20	15	13	230	30	178	22	—	42	126	497	2 1	—	
			„	77	4 8	6 4	21	21	12	13	7	5	6	—	—	2	—	—	87	42	43	2	1	52	156	222	2 3	—	(c) 2,706 Points
			„	78	4 8	5 4	11	21	21	18	2	13	20	22	21	20	21	11	201	123	75	3	—	52	156	499	2 4	—	
8	13	Mr. W. Barron, P.C.,	January	61	5 6	4 8	25	24	23	21	21	22	24	24	21	12	14	5	236	38	167	31	—	48	144	484	2 1	—	(a) 1,138 Eggs
		Woodview P. F.,	„	62	6 1	5 4	21	22	21	18	11	20	26	23	18	15	11	—	206	189	17	—	1	64	192	499	2 6	—	
		Gortrush,	„	63	6 0	D	18	18	15	16	17	15	5	D	—	—	—	—	104	70	33	1	—	50	150	254	2 4	—	(b) 27.2 oz.
		Piltown,	„	64	5 8	7 8	20	16	21	20	19	20	19	21	20	18	16	9	219	207	10	2	1	56	168	530	2 6	—	
		Co. Kilkenny.	„	65	5 12	D	17	16	18	15	15	21	22	20	18	18	18	D	198	14	166	18	—	46	138	432	2 1	—	(c) 2,624 Points
			„	66	5 12	6 7	22	21	18	19	16	17	16	15	12	9	9	1	175	175	—	—	2	61	183	425	2 9	—	
9	22	Mrs. B. Coughlan,	Feb. 27	103	5 0	5 14	22	22	20	19	19	18	21	21	19	18	4	9	212	180	25	7	—	57	171	498	2 5	—	(a) 1,294 Eggs
		Ruane,	„	104	4 12	5 12	18	23	22	20	22	21	21	23	21	20	19	5	235	11	160	64	—	24	72	395	2 0	—	
		Eyrecourt,	„	105	5 1	6 4	21	22	14	19	20	18	22	19	14	13	10	8	200	3	145	52	—	37	111	347	2 0	—	(b) 25.2 oz.
		Ballinasloe,	„	106	4 8	5 1	23	24	20	23	22	23	22	21	22	23	20	10	253	80	158	15	—	56	168	581	2 2	—	
		Co. Galway.	„	107	4 13	5 14	18	19	21	19	14	17	19	15	14	11	6	6	179	1	109	69	—	10	30	244	2 0	—	(c) 2,540 Points
			„	108	5 0	5 14	20	22	21	22	21	21	24	22	20	—	15	7	215	21	180	14	—	54	162	475	2 1	—	
10	10	Mrs. C. Monahan,	Jan. 15	49	4 11	5 2	15	20	16	18	17	17	24	23	20	19	19	6	214	184	22	8	—	43	129	499	2 5	—	(a) 1,219 Eggs
		Toor Cottage,	„	50	4 12	4 8	17	20	10	19	20	22	23	20	19	15	10	6	201	163	36	2	7	47	141	458	2 5	—	
		Ballinabrackey,	„	51	4 15	5 2	22	21	18	18	17	17	20	17	15	3	—	—	168	92	76	—	1	61	183	398	2 4	—	(b) 26.2 oz.
		Hill-of-Down,	„	52	4 8	5 8	19	19	4	21	20	19	21	14	19	20	18	9	203	11	138	54	69	14	42	183	2 0	—	
		Co. Meath	„	53	4 13	6 4	19	13	16	13	5	20	20	25	18	19	22	9	199	15	160	24	—	37	111	435	2 1	—	(c) 2,467 Points
			„	54	4 13	5 8	22	21	22	21	22	23	22	23	19	17	13	9	234	69	144	21	7	46	138	494	2 2	—	

D = Dead.

SECTION II.—WHITE WYANDOTTE (STATION HOLDERS)—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1944	No. of Bird	Weight: On Arrival lb. oz.	Weight: At Close of Test lb. oz.	Production per Period: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs oz. dr.	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
*	9	Mrs. J. Scally,	March 25	43	4 8	5 12	23	21	19	18	18	20	22	21	20	20	18	10	230	194	30	6	1	57	171	550	2 5	—	(a) 1,271 Eggs
		Ballyteague,	,,	44	5 2	6 12	22	21	22	5	1	24	25	25	24	22	22	11	224	1	42	181	—	—	—	97	1 14	—	
		Ballycommon,	,,	45	4 14	5 10	23	19	22	20	19	21	24	22	25	24	20	12	251	42	145	64	1	9	27	436	2 1	—	(b) 25.1 oz.
		Daingean,	,,	46	4 14	6 8	13	21	19	19	9	17	18	18	19	18	20	7	198	90	101	7	4	48	144	463	2 3	—	
		Offaly.	,,	47	4 10	6 14	5	25	21	22	15	23	26	24	19	10	12	—	211	41	111	59	3	6	18	332	2 1	—	(c) 2,206 Points
			,,	48	4 14	6 12	16	21	18	6	2	14	21	18	18	14	9	—	157	50	86	21	1	36	108	328	2 2	—	
11	16	Mrs. M. Heverin,	Feb. 14	67	4 12	6 12	—	22	25	20	18	22	22	19	19	20	21	8	216	50	159	7	—	46	138	513	2 2	—	(a) 886 Eggs
		Cortoon,	,,	68	4 12	5 0	—	—	—	—	4	—	8	8	5	11	5	8	49	—	8	41	—	—	—	17	1 13	—	
		Tuam,	,,	69	4 12	5 2	—	—	20	23	22	25	21	15	17	11	11	—	165	100	63	2	—	19	57	367	2 4	1	(b) 26.8 oz.
		Co. Galway.	,,	70	5 0	7 6	12	22	17	18	15	18	17	21	18	19	13	9	199	182	15	2	—	50	130	485	2 5	—	
			,,	71	4 8	6 4	—	13	21	21	19	22	20	21	6	20	18	—	181	177	4	—	—	34	102	434	2 6	1	(c) 1,933 Points
			,,	72	4 11	4 8	—	—	5	13	3	21	17	16	1	—	—	—	76	15	44	17	2	3	9	117	2 2	—	
12	21	Miss M. O'Keeffe,	March 7	97	5 3	5 4	15	22	7	17	18	22	21	17	15	8	5	3	170	112	44	14	—	30	90	358	2 4	1	(a) 713 Eggs
		Ballybooden,	,,	98	5 9	D	—	—	D	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
		Knocktopher,	,,	99	5 14	7 6	5	19	19	16	21	21	21	18	19	12	13	4	188	159	27	2	—	41	123	442	2 5	—	(b) 28.0 oz.
		Co. Kilkenny.	,,	100	6 5	7 10	8	—	—	7	7	13	9	13	10	11	7	1	86	85	1	—	17	8	24	155	2 9	—	
			,,	101	5 2	6 11	18	19	18	19	16	12	2	8	3	5	4	2	126	85	32	9	1	46	138	288	2 4	—	(c) 1,570 Points
			,,	102	5 4	7 2	—	—	—	—	14	20	21	24	21	20	16	7	143	138	4	1	—	—	—	327	2 7	—	

*Pen produced more than 20 per cent. of eggs under first grade. D = Dead.

SECTION III.—RHODE ISLAND RED—18 Pens.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1944	No. of Bird	Weight				Production per Period												Total	Grading					Scoring Points		Average Weight of Eggs		Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen (c) Scoring Point per Pen.
					On Arrival lb.	oz.	At Close of Test lb.	oz.	Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18		Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Oct. 1–Dec. 23	Full Period	oz.	dr.		
1	42	Mrs. K. Cuddihy,	Feb. 15	211	5	8	7	2	18	21	17	19	23	20	18	20	12	11	5	—	184	142	39	3	—	54	162	431	2	4	—	(a) 1,302 Eggs
		Hillside P.F.,	,,	212	5	0	5	14	24	24	22	21	21	20	20	18	21	17	21	8	237	155	78	4	—	67	201	578	2	4	—	
		Glenmore,	,,	213	5	0	6	0	23	24	25	22	23	22	25	22	23	22	22	8	261	248	18	—	—	72	216	646	2	5	—	(b) 26.9 oz.
		Co. Kilkenny.	,,	214	5	4	6	2	—	12	26	22	22	23	28	24	24	24	24	12	241	171	70	—	5	38	114	565	2	4	—	
			,,	215	5	4	6	8	20	22	22	21	13	21	25	23	23	6	21	—	217	63	136	18	—	57	171	482	2	2	1	(c) 3,093 Points
			,,	216	5	0	7	7	28	19	18	19	17	13	19	13	10	6	—	—	162	129	32	1	1	65	195	391	2	4	—	
2	41	Miss J. Weston,	March 23	205	5	10	6	6	12	19	14	—	—	17	9	20	19	16	8	3	137	37	95	5	—	43	129	334	2	2	—	(a) 1,160 Eggs
		Ballymadrough,	,,	206	5	12	6	6	—	20	21	22	21	24	23	25	24	22	23	10	235	103	129	3	—	40	120	557	2	3	—	
		Donabate,	March 10	207	5	10	5	11	9	21	19	21	16	23	22	23	15	24	7	10	210	9	152	49	—	46	138	391	2	0	—	(b) 26.6 oz.
		Co. Dublin.	,,	208	6	5	7	10	19	22	14	10	21	17	20	21	18	17	11	5	195	190	4	1	—	55	165	476	2	8	—	
			March 23	209	5	8	6	15	—	15	22	18	3	21	25	23	19	20	21	8	195	26	149	20	2	37	111	426	2	1	—	(c) 2,625 Points
			,,	210	5	7	6	2	—	22	17	18	17	19	23	14	18	17	17	6	188	165	21	2	3	39	117	441	2	5	—	
3	40	Mrs. E. O'Donnell,	Jan. 28	199	5	0	5	12	—	—	—	19	19	21	21	21	19	15	14	—	149	83	63	3	—	—	—	321	2	4	—	(a) 1,092 Eggs
		Kilbreedy West,	,,	200	4	12	5	3	18	22	21	18	15	22	24	22	24	22	16	7	231	82	144	5	—	56	168	553	2	3	—	
		Kilmallock,	,,	201	5	6	6	4	—	—	—	—	11	13	16	22	13	15	14	6	110	65	45	—	—	—	—	255	2	4	—	(b) 26.3 oz.
		Co. Limerick.	,,	202	5	12	6	14	20	24	25	21	22	24	26	24	24	23	22	9	264	63	199	2	—	67	201	645	2	2	—	
			,,	203	5	12	6	5	5	—	—	—	12	15	22	24	24	20	18	7	147	132	15	—	—	5	15	344	2	5	—	(c) 2,595 Points
			,,	204	5	0	5	4	20	17	17	—	—	20	22	24	21	20	21	9	191	47	141	3	—	51	153	477	2	2	—	
4	37	Mrs. B. McAuliffe,	Feb. 18	181	4	9	D		—	—	—	—	1	D	—	—	—	—	—	—	1	—	1	—	—	—	—	2	2	3	—	(a) 1,108 Eggs
		Farrihy,	,,	182	4	8	6	9	—	17	17	8	22	24	24	24	23	24	22	9	214	58	149	7	1	34	102	495	2	2	—	
		Broadford,	,,	183	4	8	5	3	11	18	16	22	17	23	27	25	26	25	18	6	234	73	157	4	—	41	123	550	2	3	—	(b) 26.7 oz.
		Charleville,	,,	184	5	1	7	0	—	9	16	–	17	20	24	26	28	24	21	10	195	184	9	2	—	24	72	465	2	6	—	
		(Co. Limerick).	,,	185	4	12	6	0	27	26	22	21	18	19	23	21	22	17	22	9	247	223	24	—	1	75	225	614	2	5	—	(c) 2,558 Points
			,,	186	5	4	6	9	10	24	24	19	23	23	14	16	12	25	16	11	217	42	132	43	2	56	168	432	2	1	—	
5	38	Mrs. K. Earl,	Feb. 29	157	5	3	6	3	10	22	20	20	14	17	23	23	16	23	17	12	217	68	144	5	4	49	147	511	2	3	—	(a) 1,108 Eggs
		Grantstown House,	,,	158	5	0	6	2	18	20	3	4	2	21	27	27	24	18	20	12	196	25	157	14	—	34	102	444	2	1	—	
		Waterford.	,,	159	4	10	5	7	18	20	23	12	14	20	23	26	23	22	23	11	235	15	186	34	—	56	168	499	2	1	—	(b) 25.7 oz.
			,,	160	4	12	5	4	—	5	20	9	4	21	3	24	22	5	11	—	124	97	24	3	—	24	72	281	2	4	—	
			,,	161	4	10	5	4	5	23	20	15	6	23	23	16	15	20	13	3	182	42	136	4	—	47	141	439	2	2	1	(c) 2,519 Points
			,,	162	4	8	D		—	3	14	11	12	20	22	22	23	21	D6	—	154	73	78	3	—	17	51	345	2	3	—	

D = Dead.

SECTION III.—RHODE ISLAND RED—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1944	No. of Bird	Weight On Arrival lb.	Weight On Arrival oz.	Weight At Close of Test lb.	Weight At Close of Test oz.	Production per Period: Oct. 1-Oct. 28	Oct. 29-Nov. 25	Nov. 26-Dec. 23	Dec. 24-Jan. 20	Jan. 21-Feb. 17	Feb. 18-Mar. 17	Mar. 18-Apl. 14	Apl. 15-May 12	May 13-June 9	June 10-July 7	July 8-Aug. 4	Aug. 5-Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring Special and First Grade	Special and First Grade—Oct. 1-Dec. 23	Scoring Points: Oct. 1-Dec. 23	Full Period	Average Weight of Eggs oz.	Average Weight of Eggs dr.	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
6	29	Mr. M. Fitzgibbon,	March 27	139	5	14	6	4	—	—	7	23	18	11	12	18	8	13	10	2	122	75	42	5	3	6	18	258	2	4	2	(a) 1,050 Eggs
		Gurrane,	,,	140	5	2	6	4	—	22	26	22	23	20	22	20	16	19	13	5	208	175	32	1	3	48	144	493	2	5	—	
		Kilmeedy,	,,	141	5	8	6	4	13	23	11	—	1	23	24	15	18	4	12	7	151	147	3	1	1	46	138	367	2	6	—	(b) 27.6 oz.
		Co. Limerick.	,,	142	5	10	6	7	22	24	11	—	—	13	12	18	17	12	12	7	148	146	2	—	—	57	171	384	2	7	—	
			,,	143	5	3	5	14	—	—	9	23	22	26	24	23	23	19	19	7	195	147	45	3	3	9	27	429	2	5	—	(c) 2,492 Points
			,,	144	5	10	6	6	18	24	14	—	17	24	25	24	22	23	24	11	228	116	109	1	1	55	165	561	2	2	—	
*	32	Mr. D. H. Edwards,	Jan. 15	151	5	6	6	9	25	27	22	24	23	23	25	25	27	22	22	7	272	25	213	34	—	64	192	586	2	1	—	(a) 1,294 Eggs
		Drumgowan,	,,	152	5	12	5	12	25	4	—	2	2	13	25	25	24	24	6	6	156	2	95	59	—	21	63	235	2	0	—	
		Speenogue P.O.,	,,	153	5	10	6	9	22	21	25	22	20	27	28	26	25	26	11	11	264	3	105	156	—	21	63	260	1	15	—	(b) 25.1 oz.
		Burt,	,,	154	5	13	6	4	16	—	3	22	20	23	25	22	15	18	16	3	183	78	98	7	—	16	48	405	2	3	1	
		Co. Donegal.	,,	155	5	9	6	0	—	7	26	19	18	24	26	25	26	15	22	—	208	38	166	4	5	33	99	463	2	2	1	(c) 2,466 Points
			,,	156	6	4	7	7	23	22	22	19	12	14	23	20	18	23	13	2	211	169	41	1	3	67	198	517	2	5	—	
7	30	Miss M. O'Donovan,	Feb. 1	145	6	0	7	15	5	—	6	13	13	1	—	2	5	2	4	—	51	49	2	—	4	11	33	109	2	8	—	(a) 1,032 Eggs
		Dromore,	,,	146	6	4	8	0	8	5	17	17	16	21	25	23	21	19	13	8	193	185	8	—	—	30	90	456	2	6	—	
		Villierstown,	,,	147	5	10	6	6	19	21	18	10	—	21	23	16	22	21	16	6	193	176	17	—	—	58	174	487	2	6	—	(b) 28.7 oz.
		Cappoquin,	,,	148	5	1	6	0	—	—	10	16	16	17	20	24	24	20	19	11	177	140	37	—	—	10	30	414	2	5	—	
		Co. Waterford.	,,	149	5	12	7	4	12	23	20	18	—	14	19	27	23	20	20	10	206	181	23	2	1	53	159	508	2	5	—	(c) 2,457 Points
			,,	150	6	2	7	4	—	11	22	17	24	20	22	24	22	22	20	8	212	212	—	—	9	33	99	483	2	9	—	
8	35	Capt. H. M. S. Redmond,	March 2	169	5	9	7	0	11	16	21	19	2	10	24	25	24	22	17	—	191	158	30	3	1	46	138	459	2	4	—	(a) 1,031 Eggs
		Popefield,	,,	170	5	8	6	12	—	—	5	18	19	21	23	24	22	22	21	8	183	166	17	—	2	5	15	416	2	6	—	
		Athy,	,,	171	5	4	7	2	14	8	18	18	20	9	22	16	14	12	1	—	152	125	27	—	—	40	120	357	2	6	—	(b) 27.7 oz.
		(Laoighis).	,,	172	5	2	D		—	—	8	9	4	22	19	17	D	—	—	—	79	58	20	1	—	8	24	164	2	5	—	
			,,	173	5	10	7	4	15	11	13	13	19	18	20	25	19	17	18	9	197	151	43	3	—	36	108	468	2	5	—	(c) 2,421 Points
			,,	174	6	0	6	7	22	19	23	22	19	21	24	21	20	17	14	7	229	190	39	—	1	64	192	557	2	5	—	
*	43	Mrs. L. Farrell,	March 20	469	5	10	6	4	16	24	23	19	1	21	26	27	24	27	20	11	239	115	114	10	1	55	165	567	2	8	—	(a) 1,305 Eggs
		Stanley Lodge,	,,	470	5	0	5	14	20	22	20	18	20	25	27	25	27	25	22	6	257	1	81	175	1	6	18	191	1	15	—	
		Cashel,	,,	471	5	6	6	6	18	23	21	18	19	22	22	21	22	21	20	5	232	9	179	44	—	30	90	447	2	1	—	(b) 25.1 oz.
		Co. Tipperary.	,,	472	5	1	7	4	3	18	11	15	—	4	21	25	26	24	23	3	173	161	12	—	—	32	96	428	2	7	—	
			,,	473	5	4	6	8	24	25	23	21	20	21	27	23	22	22	12	8	248	4	130	114	3	20	60	314	2	0	—	(c) 2,228 Points
			,,	474	5	0	7	0	9	21	22	18	15	25	20	20	1	—	2	3	156	22	105	29	2	30	90	281	2	1	—	

*Pen produced more than 20 per cent. of eggs under first grade. D = Dead.

SECTION III.—RHODE ISLAND RED—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1944	No. of Bird	Weight: On Arrival lb. oz.	Weight: At Close of Test lb. oz.	Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Scoring Points: Full Period	Average Weight of Eggs oz. dr.	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
9	36	Miss A. M. Dempster,	March 2	175	4 8	5 2	15	17	17	20	18	23	24	25	20	14	12	5	210	81	119	10	—	44	132	472	2 3	—	(a) 980 Eggs
		Emo Park,	,,	176	4 8	6 12	—	—	12	7	13	19	19	23	18	14	14	11	150	24	95	31	—	11	33	273	2 2	—	
		Portarlington,	,,	177	4 12	6 2	15	23	19	19	20	17	11	12	11	2	5	—	154	134	19	1	—	57	171	369	2 5	—	(b) 26.2 oz.
		Laoighis.	,,	178	4 8	5 13	—	12	12	3	11	14	18	24	13	19	15	9	150	96	53	1	—	24	72	364	2 4	—	
			,,	179	4 8	6 0	—	—	—	13	13	19	22	21	22	20	20	10	160	52	98	10	—	—	—	345	2 3	—	(c) 2,174 Points
			,,	180	5 0	7 4	3	22	13	3	18	18	18	21	21	6	13	—	156	44	105	7	—	37	111	351	2 2	—	
10	38	Mr. M. McCarthy,	Feb. 5	187	5 0	6 4	—	—	20	23	22	18	24	24	20	23	21	10	205	154	50	1	—	20	60	481	2 4	—	(a) 939 Eggs
		Caherelly Castle,	,,	188	4 11	6 9	17	19	16	8	5	19	20	20	17	14	7	—	162	107	55	—	—	52	156	397	2 4	—	
		Grange,	,,	189	5 6	7 9	14	22	24	19	23	20	22	9	—	—	—	—	153	49	98	6	—	54	162	348	2 2	—	(b) 26.0 oz.
		Kilmallock,	,,	190	5 2	7 8	18	22	12	22	19	19	12	20	11	16	7	7	185	78	103	4	3	50	150	433	2 3	1	
		Co. Limerick.	,,	191	4 10	D	12	16	9	—	D	—	—	—	—	—	—	—	37	—	20	17	—	20	60	60	1 15	—	(c) 2,158 Points
			,,	192	5 4	7 6	15	20	21	21	20	25	14	12	17	9	12	11	197	33	148	16	—	46	138	439	2 1	—	
*	26	Lady M. Athlumney,	Feb. 28	121	5 0	7 0	17	21	19	16	17	14	17	13	13	11	7	5	170	117	44	9	2	49	147	389	2 4	—	(a) 1,108 Eggs
		Somerville,	,,	122	5 0	5 12	8	20	20	21	3	16	19	21	19	17	17	8	189	6	155	28	—	36	108	398	2 1	—	
		Balrath	Jan. 30	123	5 1	7 4	—	—	19	10	6	20	18	20	15	12	17	9	146	13	122	11	1	17	51	321	2 1	—	(b) 25.0 oz.
		Co. Meath.	,,	124	5 8	6 11	6	12	20	14	8	28	25	24	26	25	21	11	215	5	115	95	—	20	60	286	2 0	—	
			,,	125	4 14	6 8	17	21	20	17	17	15	13	9	6	8	13	4	160	145	15	—	—	58	174	403	2 5	—	(c) 2,049 Points
			Feb. 28	126	4 12	5 8	19	21	21	24	19	26	19	18	19	19	13	10	228	3	97	128	1	26	78	252	1 15	—	
11	34	Mrs. D. Philpott,	March 25	163	6 12	D	4	8	—	1	6	—	—	—	—	—	D	—	19	5	11	3	3	9	21	33	2 1	—	(a) 880 Eggs
		Charlesfield,	,,	164	6 6	6 14	—	—	19	13	3	23	26	22	25	27	26	10	194	16	171	7	—	16	48	450	2 2	—	
		Banteer,	,,	165	6 0	6 4	19	19	2	—	—	14	26	26	24	23	17	—	170	56	108	6	—	35	105	403	2 2	—	(b) 25.7 oz.
		Co. Cork.	,,	166	7 3	8 0	17	16	22	9	—	14	23	15	19	18	10	3	166	77	83	6	1	51	153	399	2 3	1	
			,,	167	6 2	6 13	11	13	8	11	5	18	16	16	19	21	18	9	165	59	106	—	2	32	96	405	2 3	—	(c) 2,029 Points
			,,	168	6 10	7 6	—	12	18	14	1	11	20	18	22	20	20	10	166	28	115	23	5	27	81	339	2 2	—	
12	27	Sister-in-Charge,	—	475	5 8	7 0	—	15	21	19	2	19	22	20	24	18	18	—	178	178	—	—	—	36	108	428	2 8	—	(a) 876 Eggs
		St. Mary's Abbey,	—	476	5 8	6 4	20	18	10	9	16	20	20	19	19	13	—	—	164	158	6	—	—	48	144	389	2 6	—	
		Glencairn,	—	477	5 14	6 14	—	—	—	—	13	14	21	16	11	9	1	—	85	84	—	1	4	—	—	166	2 7	—	(b) 28.6 oz.
		Co. Waterford.	—	478	6 0	7 8	8	12	—	1	15	21	15	17	14	10	—	—	113	112	1	—	—	20	60	256	2 8	—	
			—	479	5 6	7 6	—	—	13	20	14	23	21	14	18	13	15	1	152	151	1	—	1	13	39	344	2 8	2	(c) 2,011 Points
			—	480	5 8	7 4	8	17	18	15	3	18	19	19	20	17	20	10	184	43	132	9	3	40	120	428	2 2	—	

*Pen produced more than 20 per cent. of eggs under first grade. D = Dead.

SECTION III.—RHODE ISLAND RED—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1944	No. of Bird	Weight: On Arrival lb. oz.	Weight: At Close of Test lb. oz.	Production per Period: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs oz. dr.	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
13	25	Lady M. Athlumney,	Feb. 28	115	4 8	6 6	17	25	22	22	19	19	19	16	13	10	7	4	193	9	148	36	2	54	159	381	2 0	—	(a) 876 Eggs
		Somerville	Jan. 30	116	4 11	7 0	6	21	20	20	14	22	25	23	23	23	21	11	229	17	198	14	—	42	126	524	2 1	—	
		Balrath,	"	117	4 8	D	—	—	—	—	—	—	—	—	—	—	—	D	—	—	—	—	—	—	—	—	—	—	(b) 26.5 oz.
		Co. Meath.	Feb. 28	118	4 11	D	—	—	—	2	12	13	17	11	D	—	—	—	55	18	36	1	2	—	—	104	2 3	—	
			Jan. 30	119	5 2	6 12	5	19	11	—	5	24	20	25	24	23	23	9	188	181	6	1	—	34	102	463	2 6	—	(c) 1,981 Points
			Feb. 28	120	6 2	8 3	16	18	20	19	19	19	22	23	19	15	14	7	211	197	13	1	—	53	159	509	2 6	—	
14	28	Mr. M. Fitzgibbon,	March 20	133	5 10	D	10	27	26	5	—	—	15	5	D	—	—	—	88	28	57	3	—	63	189	233	2 2	—	(a) 785 Eggs
		Gurrane,	"	134	5 14	7 3	17	21	18	16	9	20	17	15	9	8	15	7	172	164	6	2	5	56	168	412	2 6	—	
		Kilmeedy,	"	135	5 5	5 0	—	—	1	22	26	25	25	27	22	18	19	12	197	50	141	6	—	1	3	429	2 3	1	(b) 26.6 oz.
		Co. Limerick.	"	136	5 12	7 6	19	22	22	20	11	12	11	—	—	—	2	—	119	79	35	5	3	58	174	282	2 4	—	
			"	137	5 7	6 3	14	26	23	20	24	22	25	23	13	4	—	—	194	49	142	3	—	61	183	447	2 2	—	(c) 1,836 Points
			"	138	5 3	D	—	—	3	d12	—	—	—	—	—	—	—	—	15	12	3	—	—	3	9	33	2 5	—	
15	39	Rev. Bro. Dominick,	March	193	6 2	8 10	—	—	17	19	17	22	24	23	23	9	22	6	182	160	19	3	1	16	48	408	2 6	—	(a) 733 Eggs
		Agricultural College,	"	194	6 5	7 10	14	—	10	13	—	16	10	10	14	5	—	—	92	54	31	7	4	24	72	187	2 4	—	
		Mountbellew,	"	195	6 2	5 12	17	21	19	18	16	22	22	14	—	—	—	1	150	17	86	47	10	52	156	238	2 0	—	(b) 26.3 oz.
		Co. Galway.	"	196	5 3	D	23	17	17	16	22	19	7	D	—	—	—	—	121	1	74	46	—	43	129	193	2 0	—	
			"	197	5 3	D	—	—	—	—	—	—	—	17	9	D	—	—	26	1	11	14	—	—	—	24	2 0	—	(c) 1,409 Points
			"	198	4 12	6 8	—	—	—	19	24	28	25	14	15	15	17	5	162	143	18	1	—	—	—	359	2 5	1	

D = Dead.

SECTION IV.—RHODE ISLAND RED (STATION HOLDERS)—23 Pens.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1944	No. of Bird	Weight On Arrival lb. oz.	Weight At Close of Test lb. oz.	Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points Oct. 1–Dec. 23	Scoring Points Full Period	Average Weight of Eggs oz. dr.	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
1	45	Mrs. C. Healy,	Feb. 10	217	5 2	6 4	23	25	22	21	19	25	26	26	22	21	19	7	256	49	195	12	1	67	201	596	2 2	—	(a) 1,291 Eggs
		Clonmeen,	"	218	5 9	6 8	17	14	—	9	21	23	23	16	24	17	14	7	185	160	25	—	2	31	90	434	2 5	—	
		Banteer,	"	219	4 12	5 4	11	12	24	23	23	22	23	19	20	18	20	9	224	149	74	1	—	46	138	539	2 3	—	(b) 27.2 oz.
		Co. Cork.	Feb. 15	220	5 2	6 12	6	22	19	5	2	23	23	19	23	23	18	10	193	168	25	—	2	47	135	478	2 5	—	
			"	221	4 15	5 2	13	23	16	22	19	21	22	21	17	8	15	—	197	188	8	1	—	52	156	466	2 6	—	(c) 3,083 Points
			"	222	5 6	6 4	19	19	23	19	18	22	24	26	17	20	17	12	236	178	55	3	1	61	183	570	2 4	—	
2	66	Mr. D. H. Edwards,	Feb. 23	247	5 11	6 11	22	23	24	22	19	21	14	12	17	11	13	11	209	83	123	3	1	68	204	511	2 3	—	(a) 1,215 Eggs
		Drumgowan,	"	248	5 2	6 6	21	20	20	18	17	16	14	17	15	13	10	5	186	134	52	—	—	61	183	461	2 5	—	
		Speenogue P.O.,	"	249	5 8	6 12	24	25	20	20	22	22	20	12	21	23	5	9	223	115	107	1	—	68	204	549	2 3	1	(b) 27.1 oz.
		Burt,	"	250	5 14	6 12	3	16	22	4	22	25	21	22	23	18	21	9	206	115	84	7	2	40	120	478	2 4	—	
		Co. Donegal.	"	251	5 3	6 9	24	24	24	22	23	22	25	21	18	19	18	8	248	154	94	—	—	72	216	613	2 4	—	(c) 2,022 Points
			"	252	6 0	D	10	20	20	22	20	21	23	7	D	—	—	—	143	132	9	2	1	48	126	310	2 7	—	
3	80	Mrs. B. M. Rafter,	Feb. 19	325	4 15	6 0	20	23	22	17	21	19	22	18	16	15	17	6	216	121	92	3	—	63	189	527	2 3	—	(a) 1,340 Eggs
		Knockthomas,	"	326	4 8	5 0	13	23	22	21	18	19	21	17	22	11	11	4	202	26	139	37	—	39	117	394	2 1	—	
		Bagnalstown,	"	327	5 0	5 13	14	7	23	23	22	21	23	18	14	15	23	6	209	42	153	14	10	35	105	441	2 2	—	(b) 25.5 oz.
		Co. Carlow.	"	328	4 14	6 2	21	23	22	21	17	21	26	28	25	25	20	6	255	23	181	51	2	27	81	479	2 1	—	
			"	329	4 14	5 2	16	16	17	15	15	19	22	22	21	19	21	9	212	106	105	1	—	48	144	519	2 3	—	(c) 2,922 Points
			"	330	5 1	6 9	16	7	25	26	27	24	22	20	20	23	23	13	246	29	204	13	2	44	132	562	2 2	—	
4	65	Miss M. O'Donovan,	Feb. 1	241	5 10	6 5	20	21	21	20	22	20	25	24	21	19	20	5	238	108	129	1	3	62	186	571	2 3	—	(a) 1,231 Eggs
		Dromore,	"	242	5 3	6 0	12	16	20	17	2	23	23	25	20	21	21	7	207	119	78	10	4	48	144	473	2 4	—	
		Villierstown	"	243	4 12	5 10	8	1	16	7	12	17	22	21	24	19	16	5	168	129	37	2	—	23	69	395	2 4	—	(b) 26.7 oz.
		Cappoquin,	"	244	4 12	5 11	14	22	15	10	13	18	17	12	6	8	5	3	143	35	93	15	8	45	135	299	2 2	—	
		Co. Waterford.	"	245	4 10	6 1	—	5	23	18	24	25	27	27	26	23	21	8	227	194	32	1	3	28	84	523	2 5	—	(c) 2,869 Points
			"	246	5 6	5 8	21	24	23	21	22	19	21	26	22	22	17	10	248	126	122	—	2	68	204	608	2 3	—	
5	73	Mrs. D. Heafey,	March 1	283	5 13	6 10	22	19	18	15	12	20	21	22	23	21	16	7	216	192	23	1	1	59	177	529	2 5	—	(a) 1,221 Eggs
		Coolmore,	"	284	5 8	6 8	6	21	19	18	4	14	14	18	12	11	15	3	155	68	82	5	—	45	135	374	2 3	—	
		Thomastown,	"	285	5 2	6 5	22	19	19	23	23	21	25	26	24	22	16	8	248	73	169	6	1	59	174	586	2 2	—	(b) 26.5 oz.
		Co. Kilkenny.	"	286	5 2	6 3	—	10	16	8	11	20	25	26	24	17	13	4	174	28	119	27	2	23	69	334	2 2	—	
			"	287	5 8	5 14	18	19	21	18	21	18	21	22	17	17	4	8	204	175	29	—	—	58	174	495	2 5	—	(c) 2,840 Points
			"	288	5 12	6 0	27	13	—	12	24	27	28	25	25	26	7	10	224	106	115	3	—	38	114	522	2 3	1	

D = Dead

SECTION IV.—RHODE ISLAND RED (STATION HOLDERS)—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1944	No. of Bird	Weight: On Arrival (lb. oz.)	Weight: At Close of Test (lb. oz.)	Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	Grading: First Grade	Grading: Under First Grade	Grading: Non-Scoring, Special and First Grade	Grading: Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Scoring Points: Full Period	Average Weight of Eggs (oz. dr.)	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
6	81	Mrs. M. A. Kelly,	Feb. 15	331	5 1	5 2	16	9	14	—	—	1	19	14	12	11	—	—	96	26	54	16	—	36	108	201	2 1	3	(a) 1,255 Eggs
		Carranstown,	”	332	4 14	5 8	12	25	23	23	21	20	16	20	8	8	13	—	189	177	12	—	1	60	180	457	2 6	1	
		Ballivor,	”	333	4 8	5 6	10	28	26	24	25	27	26	25	26	23	21	14	275	13	230	32	—	46	138	586	2 1	—	(b) 25.8 oz.
		Co. Meath.	”	334	4 8	5 14	21	25	24	24	23	24	26	24	27	17	19	10	264	52	198	14	5	67	201	591	2 2	—	
			”	335	4 10	5 8	18	22	22	23	22	22	24	22	21	18	18	9	241	64	166	11	5	57	171	548	2 2	—	(c) 2,803 Points
			”	336	5 0	6 11	—	17	22	21	21	22	20	20	20	11	13	3	190	32	152	6	3	39	117	420	2 2	—	
7	84	Mrs. L. Hayes,	Feb. 13	343	6 2	6 7	21	21	21	18	21	21	25	26	23	24	13	2	236	220	15	1	2	63	189	568	2 6	—	(a) 1,202 Eggs
		Walshestown,	”	344	5 5	5 15	21	22	22	21	20	18	19	17	12	9	8	2	191	139	51	1	28	65	192	396	2 4	—	
		Castlemahon,	”	345	5 12	7 3	—	—	11	14	12	20	22	26	23	25	23	11	187	23	146	18	—	11	33	400	2 1	—	(b) 26.4 oz.
		Newcastlewest,	”	346	5 10	6 3	18	21	24	20	22	17	13	2	4	4	—	—	145	89	56	—	6	63	189	345	2 4	—	
		Co. Limerick.	”	347	5 8	6 8	9	15	16	19	20	23	25	19	20	19	20	10	215	37	171	7	1	35	105	497	2 2	—	(c) 2,728 Points
			”	348	5 4	6 8	5	19	19	21	23	20	23	25	26	23	15	9	228	33	187	8	1	41	123	522	2 2	—	
8	69	Mrs. R. Cochrane,	Feb. 15	265	5 0	5 15	—	16	23	20	21	23	25	24	23	14	—	—	189	185	4	—	—	39	117	431	2 7	1	(a) 1,190 Eggs
		Springlawn,	”	266	5 0	D	8	23	26	24	22	13	—	D	—	—	—	—	116	102	14	—	—	57	171	289	2 6	—	
		Tullyroe,	”	267	5 1	6 10	19	24	24	24	22	23	23	23	24	23	20	11	260	74	175	11	—	60	180	611	2 2	—	(b) 27.5 oz.
		Roscommon.	”	268	4 15	6 9	15	22	23	24	22	23	19	17	22	14	10	5	216	89	111	16	16	48	144	440	2 3	—	
			”	269	5 6	6 13	—	15	20	20	22	19	22	25	19	20	17	8	207	161	43	3	12	35	105	458	2 6	—	(c) 2,708 Points
			”	270	4 12	6 11	—	3	22	20	22	22	23	19	21	22	18	10	202	195	7	—	—	25	75	479	2 6	—	
9	62	E. Bean Mhic Dhomhnaill,	Feb. 18	229	4 8	5 2	26	23	22	17	—	20	26	26	24	24	23	12	243	41	192	10	8	65	195	566	2 2	—	(a) 1,196 Eggs
		Imeall Átha,	”	230	4 8	5 3	22	22	23	20	23	25	24	26	19	10	15	4	233	9	193	31	1	64	192	488	2 1	—	
		Baile an Fheirteirigh,	”	231	5 0	5 14	23	25	21	21	22	24	21	23	17	15	5	1	218	57	160	1	—	68	204	523	2 2	—	(b) 26.2 oz.
		Co. Chiarraidhe,	”	232	4 8	6 14	–	8	17	8	8	18	25	24	27	20	5	8	168	134	33	1	17	25	75	345	2 6	—	
			”	233	5 0	6 9	17	20	20	20	23	23	22	16	19	14	15	—	209	167	41	1	6	56	168	483	2 5	—	(c) 2,680 Points
			Jan. 23	234	4 13	6 2	9	3	19	20	17	15	11	13	9	7	2	—	125	54	67	4	1	27	81	275	2 8	—	
10	64	Mrs. K. Sammon,	Feb. 19	127	5 0	7 2	—	9	25	19	19	18	15	21	17	15	16	7	181	55	119	7	—	31	93	416	2 3	—	(a) 1,136 Eggs
		Carrigahorig,	”	128	5 3	5 12	18	17	17	6	—	4	13	22	20	19	18	9	163	10	134	19	—	49	147	376	2 1	—	
		Lorrha,	”	129	4 8	5 15	—	—	—	—	—	22	21	21	21	20	19	8	132	126	6	—	—	—	—	311	2 7	—	(b) 26.9 oz.
		Birr,	”	130	5 0	8 1	—	22	28	27	23	27	23	20	18	11	2	—	201	121	75	5	7	47	141	436	2 4	—	
		Offaly.	”	131	5 4	6 8	22	22	22	23	19	23	24	27	26	24	22	9	263	185	78	—	—	66	198	647	2 4	—	(c) 2,658 Points
			”	132	4 12	5 10	9	20	18	19	20	14	20	23	17	16	14	6	196	173	23	—	1	47	141	472	2 5	—	

D = Dead

SECTION IV.—RHODE ISLAND RED (STATION HOLDERS)—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1944	No. of Bird	Weight: On Arrival (lb. oz.)	Weight: At Close of Test (lb. oz.)	Production per Period: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs (oz. dr.)	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
11	74	Mrs. M. C. McCormack,	February	289	5 13	6 6	2	—	19	21	20	20	21	22	22	20	20	7	194	190	4	—	—	21	63	456	2 7	—	(a) 1,155 Eggs
		Bawnogues P.F.,	"	290	5 5	6 4	19	20	19	6	6	24	26	25	24	22	22	10	223	195	28	—	—	58	174	558	2 5	—	
		Kilcock,	"	291	5 6	5 14	17	21	21	13	17	20	21	17	18	16	13	5	199	15	159	25	—	44	132	426	2 1	—	(b) 27.4 oz.
		Co. Kildare.	"	292	5 3	5 12	6	19	17	17	14	16	18	14	14	14	13	7	169	164	4	1	—	41	123	411	2 8	—	
			"	293	5 4	5 14	22	17	19	19	21	18	20	19	17	14	12	—	198	57	97	44	—	23	69	357	2 2	—	(c) 2,630 Points
			"	294	5 0	5 7	19	18	20	7	—	19	24	25	17	15	1	7	172	168	3	1	—	57	171	422	2 6	—	
12	79	Miss M. Mulcahy,	Jan. 10	319	5 0	5 10	17	21	15	19	13	14	23	14	13	6	8	6	169	154	15	—	20	53	141	361	2 4	—	(a) 1,106 Eggs
		Abbeyview,	February	320	5 8	6 11	25	24	24	25	24	24	22	28	20	19	9	3	242	167	73	2	1	72	216	581	2 4	—	
		Clonmel,	"	321	5 10	5 6	22	23	22	20	17	20	19	21	19	11	6	—	200	184	16	—	2	67	201	466	2 5	—	(b) 28.6 oz.
		(Co. Waterford).	Jan. 10	322	5 12	6 8	—	5	23	19	4	14	21	15	13	16	1	—	131	129	2	—	—	28	84	307	2 8	1	
			February	323	6 0	8 2	17	15	15	15	12	16	21	22	18	14	17	6	188	188	—	—	2	47	141	454	2 10	—	(c) 2,509 Points
			Jan. 10	324	5 10	7 2	18	15	—	—	10	23	25	20	20	19	19	7	176	172	4	—	—	33	99	430	2 7	—	
13	77	Miss J. Weston,	Feb. 29	439	6 0	8 1	21	22	20	16	17	20	21	22	20	21	21	9	230	162	61	7	—	56	168	553	2 4	—	(a) 1,017 Eggs
		Ballymacrough,	"	440	6 10	6 15	16	—	21	19	5	25	28	27	16	25	7	13	202	160	40	2	1	36	108	479	2 5	—	
		Donabate,	"	441	6 0	7 0	—	—	15	17	1	16	27	7	21	11	10	9	134	131	3	—	1	15	45	310	2 7	1	(b) 27.8 oz.
		Co. Dublin.	"	442	6 2	7 8	11	—	—	11	26	24	24	21	17	25	12	9	180	71	101	8	1	5	15	392	2 3	—	
			March 10	443	5 10	D	24	16	21	21	17	11	16	8	D5	—	—	—	139	87	47	5	6	56	168	312	2 4	—	(c) 2,328 Points
			"	444	6 0	6 12	—	—	—	10	22	23	24	22	10	11	8	2	132	130	2	—	1	—	—	282	2 9	1	
14	75	Mrs. E. Hammersley,	Jan. 21	295	5 5	7 3	25	23	22	10	18	21	20	9	4	8	15	5	180	176	4	—	8	70	210	437	2 8	—	(a) 1,103 Eggs
		Ashvale,	"	296	4 14	5 9	18	23	21	22	20	23	20	22	24	17	20	7	237	202	32	3	10	62	186	547	2 5	—	
		Lattin,	"	297	5 0	7 5	—	—	12	21	23	23	21	18	16	19	17	7	177	163	12	2	13	12	36	369	2 8	—	(b) 29.8 oz.
		Tipperary.	"	298	5 0	7 5	—	15	18	20	17	21	19	16	14	13	14	3	170	156	14	—	8	33	99	381	2 8	—	
			"	299	5 2	7 0	—	20	25	23	23	23	21	20	17	14	16	6	208	207	1	—	2	45	135	491	2 3	—	(c) 2,324 Points
			"	300	4 8	6 7	—	—	18	13	9	21	21	16	18	5	10	—	131	125	6	—	91	18	54	99	2 7	1	
15	76	Mrs. E. O'Donnell,	Jan. 28	301	5 1	6 0	2	—	6	19	17	22	21	21	17	20	19	9	173	129	44	—	—	8	24	402	2 5	—	(a) 989 Eggs
		Kilbreedy West,	"	302	5 10	6 15	—	—	9	21	21	23	23	21	23	19	20	11	191	188	3	—	—	9	27	441	2 9	—	
		Kilmallock,	"	303	5 10	6 7	13	3	25	23	21	23	21	21	18	15	10	5	198	86	111	1	—	41	123	464	2 3	—	(b) 27.3 oz.
		Co. Limerick.	"	304	5 0	D	—	—	17	20	22	21	14	7	—	—	D	—	101	22	76	3	—	17	51	213	2 2	—	
			"	305	5 2	5 15	16	17	19	5	—	10	26	25	23	23	19	7	190	41	140	9	—	51	153	461	2 2	—	(c) 2,303 Points
			"	306	4 12	5 8	—	—	13	15	5	6	18	20	22	16	12	9	136	90	46	—	—	13	39	322	2 4	—	

D = Dead

SECTION IV.—RHODE ISLAND RED (STATION HOLDERS)—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1944	No. of Bird	Weight: On Arrival (lb. oz.)	Weight: At Close of Test (lb. oz.)	Production per Period: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs (oz. dr.)	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
16	44	Mrs. M. Browne,	Feb. 20	223	5 5	7 2	13	23	22	23	22	26	25	28	26	21	23	10	262	154	101	7	—	52	156	615	2 4	—	(a) 1,022 Eggs
		Ballybane,	”	224	5 2	7 3	—	2	21	20	16	20	16	7	13	—	6	—	121	85	33	3	1	22	66	262	2 5	—	
		Firies,	”	225	5 0	7 2	—	–	7	17	5	10	13	10	14	15	10	3	104	98	6	—	—	7	21	243	2 7	1	(b) 27.2 oz.
		Co. Kerry.	”	226	5 8	7 9	–	16	18	21	16	19	26	25	22	22	19	9	213	157	55	1	19	33	93	453	2 5	—	
			”	227	4 8	5 10	—	—	—	—	4	25	22	18	14	17	7	10	117	30	81	6	—	—	—	253	2 3	1	(c) 2,297 Points
			”	228	5 1	D	—	15	22	22	24	23	28	26	21	19	D5	—	205	125	80	—	—	37	111	471	2 4	—	
17	70	Mrs. B. McAuliffe,	Feb. 18	271	5 6	5 15	16	18	23	23	20	23	20	22	18	—	—	—	183	163	20	—	1	57	171	421	2 6	—	(a) 1,007 Eggs
		Farrihy,	”	272	5 0	5 13	2	21	20	22	20	21	21	22	23	23	22	9	226	221	5	—	—	43	129	549	2 6	—	
		Broadford,	”	273	5 3	D	—	—	19	23	12	18	12	16	5	D9	—	—	114	89	20	5	13	18	54	218	2 6	—	(b) 27.3 oz.
		Charleville,	”	274	5 2	7 10	10	23	20	20	10	—	—	14	5	—	—	—	102	1	69	32	—	43	129	183	2 0	—	
		(Co. Limerick).	”	275	5 3	5 15	10	22	19	10	–	15	25	23	20	19	20	9	192	141	51	—	—	51	153	483	2 4	—	(c) 2,282 Points
			”	276	4 14	5 9	10	24	2	23	18	23	26	13	22	14	7	8	190	55	130	5	1	33	99	428	2 3	—	
18	72	Mrs. J. McCarthy,	Feb. 5	277	5 3	6 11	23	23	20	17	—	1	2	22	10	22	22	11	173	69	87	17	—	52	156	419	2 2	—	(a) 1,030 Eggs
		Caherelly Castle,	”	278	5 0	6 4	—	—	—	—	18	27	26	24	25	23	23	11	177	14	134	29	—	—	—	340	2 1	—	
		Grange,	”	279	5 3	6 7	23	20	19	16	17	16	22	21	16	9	11	3	193	14	146	33	—	37	111	380	2 1	—	(b) 25.4 oz.
		Kilmallock,	”	280	5 3	7 4	8	23	20	22	22	23	21	18	21	12	19	7	216	23	184	9	1	48	144	494	2 2	—	
		Co. Limerick.	”	281	4 14	5 4	24	23	22	22	6	—	22	17	16	6	—	—	158	22	119	17	1	55	165	341	2 1	1	(c) 2,248 Points
			”	282	4 13	5 7	12	11	—	—	—	9	22	11	23	11	13	1	113	92	21	—	—	23	69	274	2 5	—	
19	78	Mrs. E. Wilson,	Feb. 29	313	5 0	7 2	—	4	19	10	12	18	16	13	20	14	14	3	143	141	2	—	32	23	69	256	2 8	—	(a) 1,008 Eggs
		Guilcagh,	”	314	5 4	7 14	7	13	13	12	13	8	14	9	5	6	10	2	112	75	36	1	13	32	87	165	2 4	—	
		Portlaw,	”	315	4 14	6 14	—	—	18	18	22	16	21	23	23	23	18	7	189	189	—	—	1	18	54	441	2 8	—	(b) 29.6 oz.
		Co. Waterford.	”	316	4 12	6 13	—	—	8	19	4	16	25	23	21	20	20	10	166	166	—	—	1	8	24	388	2 10	—	
			”	317	5 0	7 4	—	6	20	11	7	23	24	21	19	20	21	10	182	176	6	—	2	26	78	435	2 9	—	(c) 2,186 Points
			”	318	5 2	6 14	8	18	16	28	2	20	21	27	24	23	23	11	216	206	8	2	9	40	105	501	2 6	—	
20	82	Miss C. Mealiff,	Feb. 28	337	6 9	7 10	—	4	19	19	17	18	24	24	24	16	15	10	190	85	105	—	—	23	69	444	2 3	—	(a) 853 Eggs
		Ballinamona House,	Feb. 3	338	5 8	5 15	23	3	—	3	25	23	14	15	13	15	17	3	154	19	114	21	1	17	51	312	2 1	1	
		Tullamore,	Feb. 28	339	6 6	6 8	16	19	19	20	19	18	21	17	12	2	15	—	178	52	124	2	—	53	159	422	2 3	1	(b) 26.4 oz.
		Offaly.	”	340	5 8	7 8	6	18	21	22	19	22	25	20	20	20	16	10	219	143	72	4	3	45	135	509	2 4	—	
			”	341	6 1	D	4	2	7	1	D7	—	—	—	—	—	—	—	21	—	12	9	3	6	15	23	1 14	—	(c) 1,896 Points
			”	342	5 7	7 7	—	3	4	4	17	15	17	15	16	—	—	—	91	81	9	1	—	6	18	186	2 7	—	

D = Dead

SECTION IV.—RHODE ISLAND RED—(STATION HOLDERS)—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1944	No. of Bird	Weight: On Arrival lb. oz.	Weight: At Close of Test lb. oz.	Production per Period: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs oz. dr.	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
21	101	Mrs. M. Smyth,	February	391	4 14	8 2	—	9	27	26	21	27	27	9	23	—	—	—	169	167	2	—	—	36	108	374	2 7	1	(a) 812 Eggs
		Kilcloon,	"	392	4 8	D	17	19	19	17	21	17	7	D	—	—	—	—	117	87	30	—	—	55	165	289	2 4	—	
		Dunboyne,	"	393	4 13	D	22	18	20	16	19	19	22	23	21	18	10	D	208	79	118	11	—	60	180	472	2 3	—	(b) 27.6 oz.
		Co. Meath.	"	394	4 10	D	23	21	1	15	21	12	14	6	11	5	D	—	129	100	29	—	—	45	135	308	2 4	3	
			"	395	4 8	D	—	21	20	19	20	21	17	16	D	—	—	—	134	121	13	—	1	41	123	307	2 5	—	(c) 1,882 Points
			"	396	4 8	D	—	5	17	18	15	—	D	—	—	—	—	—	55	55	—	—	—	22	66	132	2 8	—	
22	68	Capt. H. M. S. Redmond,	March 2	259	4 12	4 0	5	—	—	6	1	18	18	2	—	—	—	—	50	3	18	29	—	3	9	45	2 0	—	(a) 602 Eggs
		Popefield,	"	260	5 10	D	18	3	—	19	14	D	—	—	—	—	—	—	54	5	29	20	—	12	36	80	2 0	—	
		Athy,	"	261	6 2	D	—	—	—	—	—	D	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	(b) 26.8 oz.
		(Laoighis).	"	262	5 3	6 2	—	—	18	21	24	24	24	20	13	13	5	—	162	137	25	—	3	18	54	353	2 7	—	
			"	263	5 3	6 15	5	1	11	14	20	22	24	25	24	16	12	8	182	84	94	4	1	15	45	403	2 4	—	(c) 1,226 Points
			"	264	6 3	7 9	-	—	-	7	17	19	21	23	22	13	21	11	154	79	75	—	3	—	—	345	2 4	—	
23	67	Mrs. D. Philpott,	March 25	253	6 10	5 0	—	4	5	—	—	15	23	22	12	—	—	—	81	14	66	1	—	9	27	169	2 2	—	(a) 502 Eggs
		Charlesfield,	"	254	7 6	7 4	—	—	18	18	17	17	21	27	26	26	24	10	204	104	97	3	—	16	48	478	2 4	—	
		Banteer,	"	255	5 14	D	—	—	—	—	—	18	11	—	D	—	—	—	29	18	10	1	3	—	—	50	2 4	—	(b) 26.8 oz.
		Co. Cork.	"	256	5 14	D	—	—	—	—	—	—	—	—	D	—	—	—	—	—	—	—	—	—	—	—	—	—	
			"	257	6 6	6 0	13	20	8	—	—	11	23	22	20	20	9	—	146	113	28	5	1	36	108	345	2 4	—	(c) 1,131 Points
			"	258	6 0	D	—	—	7	—	8	11	16	—	D	—	—	—	42	38	4	—	1	7	21	80	2 6	—	

D = Dead.

SECTION V.—ANY NON-SITTING BREED—13 Pens.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1944	No. of Bird	Weight: On Arrival lb.	Weight: On Arrival oz.	Weight: At Close of Test lb.	Weight: At Close of Test oz.	Production per Period: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5 Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First-Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs oz.	dr	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
1	100	*White Leghorn* Mrs. M. E. Shanley,	March 7	613	4	0	4	15	18	20	18	18	18	18	19	7	—	—	—	—	136	64	67	5	—	53	159	315	2	4	—	(a) 1,234 Eggs
		Drumard,	,,	614	4	0	4	8	19	18	19	20	20	20	22	22	22	23	17	2	224	147	74	3	2	54	162	532	2	4	—	
		Dromod,	,,	615	3	4	3	8	20	19	23	16	20	20	24	23	25	24	20	10	244	17	123	104	—	37	111	332	2	0	—	(b) 25.8 oz.
		Co. Leitrim	,,	616	4	0	5	14	19	21	13	5	21	22	21	23	17	21	19	11	213	56	146	11	1	48	141	499	2	2	—	
			,,	617	3	6	3	14	21	20	21	19	18	21	18	22	22	20	20	8	230	96	127	7	1	58	174	548	2	3	—	(c) 2,661 Points
			,,	618	3	8	4	0	17	14	16	13	16	17	18	17	21	15	15	8	187	89	90	8	—	39	117	435	2	3	—	
2	87	*White Leghorn* Mrs. W. Byrne,	February	553	4	0	5	3	14	15	10	4	19	22	19	21	16	20	20	9	189	174	15	—	—	39	117	466	2	5	—	(a) 1,059 Eggs
		Kilcar,	,,	554	4	6	5	3	14	17	17	19	12	19	23	18	14	—	3	—	156	156	—	—	—	48	144	363	2	9	—	
		Curraghboy,	,,	555	4	2	4	9	19	19	20	19	21	20	20	18	12	15	10	6	199	191	7	1	—	57	171	484	2	5	—	(b) 28.4 oz.
		Athlone,	,,	556	4	8	5	10	20	12	17	4	16	20	22	18	16	13	13	3	174	165	8	1	—	48	144	423	2	6	—	
		Co. Roscommon.	,,	557	4	2	5	0	20	11	9	11	11	18	19	16	15	6	11	5	152	148	4	—	—	40	120	366	2	7	—	(c) 2,555 Points
			,,	558	4	4	4	14	16	17	20	18	16	21	17	17	16	12	13	6	189	125	61	3	—	50	150	453	2	4	—	
3	96	*White Leghorn* Mrs. B. Comack,	Feb. 23	607	4	0	4	11	19	19	21	17	23	20	20	23	17	14	5	1	199	128	73	3	5	56	165	453	2	4	—	(a) 1,116 Eggs
		Clooneenblakeney,	,,	608	3	12	5	2	17	5	7	11	8	19	22	19	18	17	11	2	156	135	21	—	—	29	87	371	2	5	—	
		Strokestown,	,,	609	4	0	4	9	12	18	18	19	17	22	22	21	19	18	18	6	210	29	146	35	1	37	111	418	2	1	—	(b) 26.2 oz.
		Co. Roscommon.	,,	610	3	6	3	15	—	20	21	18	19	21	22	19	19	12	20	3	194	32	145	17	-	40	120	423	2	2	—	
			,,	611	3	12	4	13	5	16	20	7	7	22	22	20	20	15	19	10	183	59	111	13	22	41	87	360	2	1	—	(c) 2,445 Points
			,,	612	4	4	5	0	—	8	18	7	8	21	23	22	18	20	20	8	173	162	11	—	—	26	78	420	2	6	—	
4	95	*White Leghorn* Sister-in-Charge,	Jan. 6	601	4	1	4	6	20	14	20	10	16	20	22	17	16	18	18	6	197	109	88	—	—	54	162	490	2	4	—	(a) 1,023 Eggs
		St. Martha's College,	Feb. 16	602	3	14	4	8	21	17	17	8	—	20	24	25	25	23	19	7	206	116	89	1	—	54	162	513	2	4	—	
		An Uaimh,	Jan. 14	603	4	0	4	0	18	9	—	8	8	22	20	17	1	13	9	—	125	78	46	1	—	26	78	296	2	4	—	(b) 27.0 oz.
		Co. Meath.	,,	604	3	14	4	6	14	22	18	7	—	21	23	17	20	16	10	—	168	119	48	1	-	53	159	413	2	4	—	
			,,	605	4	1	4	0	18	3	7	16	22	23	25	21	21	18	10	—	184	120	62	2	—	28	84	419	2	4	—	(c) 2,439 Points
			March 19	606	3	12	5	4	—	—	4	19	18	19	20	22	18	12	11	—	143	127	14	2	—	4	12	308	2	6	..	
5	88	*White Leghorn* Mrs. M. Hanly,	Feb. 27	559	4	4	6	3	—	5	17	15	1	17	21	17	19	13	20	5	150	92	58	—	—	22	66	360	2	4	—	(a) 960 Eggs
		Cooga,	,,	560	4	2	4	8	6	18	16	5	—	—	—	—	—	—	—	—	45	41	4	—	—	40	120	130	2	5	—	
		Doon,	,,	561	4	0	4	9	—	2	21	17	18	19	24	23	23	19	15	8	189	155	34	—	—	23	69	443	2	5	—	(b) 27.4 oz.
		Co. Limerick.	,,	562	4	2	5	0	21	16	21	4	—	20	26	19	20	22	16	11	196	134	61	1	—	57	171	496	2	4	—	
			,,	563	4	3	5	3	13	—	4	19	20	24	22	22	22	21	19	9	195	116	79	—	—	17	51	456	2	4	-	(c) 2,339 Points
			,,	564	4	3	5	8	3	8	15	17	4	15	21	23	21	26	22	10	185	160	25	—	—	26	78	454	2	5	—	

SECTION V.—ANY NON-SITTING BREED—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1944	No. of Bird	Weight: On Arrival (lb. oz.)	Weight: At Close of Test (lb. oz.)	Production per Period: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs (oz. dr)	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
6	90	*White Leghorn* Miss A. M. Dempster,	March 23	571	3 0	3 8	13	17	19	18	19	23	23	22	19	13	14	1	201	21	140	40	—	21	63	368	2 1	—	(a) 1,161 Eggs
		Emo Park,	,,	572	3 2	3 8	5	16	2	5	8	20	22	23	14	17	8	—	140	23	90	27	—	19	57	259	2 1	—	
		Portarlington,	,,	573	3 2	4 5	12	19	21	19	19	22	23	24	19	21	23	11	233	10	183	40	—	26	78	459	2 1	—	(b) 24.6 oz.
		Laoighis.	,,	574	3 0	4 2	—	—	12	20	18	21	24	24	23	24	23	11	200	1	110	89	53	7	—	131	1 14	—	
			,,	575	3 0	4 8	—	12	21	20	21	23	23	23	19	21	20	10	213	95	115	3	3	31	93	493	2 3	—	(c) 2,050 Points
			,,	576	3 0	3 10	—	5	20	18	19	21	22	21	19	18	11	—	174	10	140	24	1	16	48	340	2 0	—	
7	85	*White Leghorn* Mrs. M. O'Shea,	Feb. 3	541	4 4	5 8	20	20	18	18	21	14	—	10	—	—	4	—	125	5	108	12	1	51	153	278	2 1	—	(a) 1,031 Eggs
		Farrantane,	,,	542	4 2	D	10	17	17	14	1	6	12	21	D7	—	—	—	105	47	45	13	—	41	123	225	2 3	—	
		Castlegregory,	,,	543	3 12	4 6	14	17	19	18	19	22	21	16	20	17	11	6	200	186	14	—	1	50	150	481	2 6	—	(b) 25.7 oz.
		Co. Kerry.	,,	544	3 7	4 6	17	22	19	14	1	21	26	25	25	20	23	10	223	5	99	119	—	27	81	253	1 15	—	
			,,	545	3 11	5 0	—	17	22	21	20	20	24	23	25	9	22	3	206	66	129	11	23	38	57	393	2 2	—	(c) 2,028 Points
			,,	546	3 12	D	19	22	20	20	21	23	24	21	D2	—	—	—	172	96	73	3	—	60	180	398	2 3	—	
8	91	*White Leghorn* Mrs. A. Collins,	Jan. 28	577	3 6	4 0	17	15	17	16	13	21	20	20	22	21	21	10	213	180	33	—	—	49	147	527	2 5	—	(a) 845 Eggs
		Imanemore,	,,	578	4 0	5 2	20	14	14	14	3	20	24	23	19	21	18	9	199	196	3	—	—	48	144	494	2 7	—	
		Barnaderg,	,,	579	3 14	3 0	16	5	17	13	2	19	21	20	16	5	—	—	134	111	21	2	—	36	108	305	2 5	—	(b) 28.2 oz.
		Ballyglunin,	,,	580	3 10	4 9	4	6	—	10	7	24	23	21	19	9	22	9	154	141	13	—	—	10	30	358	2 6	—	
		Co. Galway.	,,	581	3 12	5 2	—	—	—	5	5	6	7	6	6	5	—	1	41	34	7	—	—	—	—	88	2 5	—	(c) 2,027 Points
			,,	582	4 0	5 8	16	14	16	16	16	12	9	2	2	—	1	—	104	97	7	—	—	46	138	255	2 5	—	
9	94	*White Leghorn* Mrs. S. Jones,	April 5	595	4 3	D	6	10	8	4	—	7	9	8	11	—	D	—	63	62	1	—	—	24	72	150	2 7	—	(a) 807 Eggs
		Balduncan,	April 21	596	3 10	4 9	—	—	—	—	4	17	18	13	13	16	13	4	98	85	13	—	23	—	—	183	2 5	—	
		Skerries,	,,	597	3 6	4 12	—	—	1	19	17	17	21	19	20	21	18	4	157	143	14	—	—	1	3	358	2 6	—	(b) 27.8 oz.
		Co. Dublin.	,,	598	3 6	4 6	—	—	—	13	18	18	21	18	18	15	12	6	139	129	10	—	—	—	—	311	2 6	—	
			,,	599	3 4	4 8	—	—	10	21	18	24	25	27	23	21	14	5	188	98	87	3	—	10	30	419	2 4	—	(c) 1,805 Points
			,,	600	3 4	4 3	—	16	11	7	1	21	22	21	21	20	18	4	162	118	41	3	—	24	72	384	2 4	—	
10	86	*White Leghorn* Mr. M. Fitzgibbon,	April 6	547	4 7	5 4	19	14	18	10	8	22	18	22	20	21	20	8	200	197	3	—	—	51	153	500	2 8	—	(a) 767 Eggs
		Gurrane,	,,	548	4 8	D	13	7	5	—	—	5	D	—	—	—	—	—	30	30	—	—	—	25	75	85	2 5	—	
		Kilmeedy,	,,	549	4 14	D	—	—	—	—	2	19	13	15	7	—	D	—	56	56	—	—	—	—	—	112	2 7	—	(b) 28.2 oz.
		Co. Limerick.	,,	550	4 3	5 6	—	—	—	5	17	21	23	24	16	20	19	11	156	150	5	1	1	—	—	357	2 7	—	
			April 30	551	3 14	4 7	4	21	18	12	22	20	21	22	21	22	21	9	213	38	167	8	—	38	114	500	2 2	—	(c) 1,787 Points
			,,	552	4 0	4 12	—	—	—	7	14	19	23	19	19	11	—	—	112	105	6	1	—	—	—	233	2 6	—	

D = Dead.

SECTION V.—ANY NON-SITTING BREED—continued.

Order of Merit	Number of Pen	Name and Address Owner	Date of Hatching in 1944	No. of Bird	Weight On Arrival lb. oz.	Weight At Close of Test lb. oz.	Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15 May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug 5–Aug. 18	Total	Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points Oct. 1–Dec. 23	Scoring Points Full Period	Average Weight of Eggs oz. dr.	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
*	93	*White Leghorn* Mrs. M. J. Smyth,	March 28	589	4 0	4 9	17	13	19	18	13	18	10	18	23	15	9	7	180	65	109	6	—	45	135	424	2 3	—	(a) 1,116 Eggs
		Colmanstown,	„	590	3 13	3 14	20	3	12	14	21	20	22	24	21	19	13	1	190	14	138	38	—	18	54	351	2 1	—	
		Ballinasloe,	„	591	4 4	4 9	22	20	19	15	20	23	26	21	24	21	17	8	236	1	39	196	—	28	84	108	1 13	—	(b) 23.7 oz.
		Co. Galway.	April	592	3 14	4 0	7	14	17	12	3	18	21	14	8	14	11	—	139	26	96	17	—	35	105	303	2 2	—	
			March 28	593	3 14	4 6	20	19	21	11	8	20	20	21	17	21	20	7	205	—	73	132	1	4	12	171	1 15	—	(c) 1,405 Points
			„	594	4 0	3 9	20	1	6	5	22	24	25	24	19	20	—	—	166	1	21	144	—	2	6	48	1 14	—	
*	92	*White Leghorn* Rev. Bro. Dominick,	March	583	4 2	D	5	6	1	2	—	—	—	—	D	—	—	—	14	—	—	14	—	—	—	—	1 13	—	(a) 765 Eggs
		Agricultural College,	„	584	4 1	D	—	6	5	5	5	19	18	16	12	2	—	D	88	27	58	3	—	11	33	183	2 3	—	
		Mountbellew,	„	585	3 0	4 3	17	4	19	15	19	22	22	24	22	17	20	7	208	3	79	126	—	17	51	197	1 15	—	(b) 25.6 oz.
		Co. Galway.	„	586	3 1	D	12	16	12	13	19	18	17	16	D7	—	—	—	130	19	82	29	—	19	57	221	2 1	—	
			„	587	3 5	4 6	—	7	21	17	16	13	18	19	20	22	16	9	183	177	6	—	—	28	84	441	2 7	—	(c) 1,370 Points
			„	588	3 0	4 3	7	16	—	7	6	13	23	21	16	20	8	5	142	27	110	5	—	22	66	328	2 2	—	
11	89	*White Leghorn* Miss A. Fitzgerald,	March	565	3 7	D	—	17	4	13	4	12	8	D	—	—	—	—	58	7	40	11	—	14	42	108	2 1	—	(a) 631 Eggs
		Ardgoul,	„	566	3 6	D	—	—	—	20	15	21	4	—	D1	—	—	—	61	42	19	—	—	—	—	122	2 4	—	
		Rathkeale,	„	567	3 0	4 12	—	—	—	—	—	12	23	27	20	23	22	10	137	51	85	1	—	—	—	326	2 3	—	(b) 26.2 oz.
		Co. Limerick.	„	568	3 0	D	—	—	D	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
			„	569	3 4	5 3	—	16	20	19	18	21	21	16	20	21	18	8	198	16	136	46	—	12	36	363	2 1	—	(c) 1,325 Points
			„	570	3 0	4 [illegible]	—	—	14	15	18	19	25	24	18	23	16	5	177	138	37	2	—	14	42	406	2 5	—	

*Pen produced more than 20 per cent. of eggs under first grade. D = Dead.

SECTION VI.—ANY OTHER UTILITY BREED—16 Pens.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1944	No. of Bird	Weight: On Arrival lb. oz.	Weight: At Close of Test lb. oz.	Production per Period: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs oz. dr.	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
1	110	*Light Sussex* Mrs. A. Quilty,	February	403	5 1	6 14	12	21	20	18	20	22	21	23	21	19	17	10	224	181	41	2	—	52	156	541	2 4	—	(a) 1,241 Eggs
		Nicholastown,	,,	404	6 0	7 7	23	21	19	18	17	21	23	20	19	19	16	7	223	168	52	3	—	60	180	542	2 4	—	
		Mooncoin,	,,	405	5 10	6 15	25	25	21	21	20	19	19	19	19	15	10	8	221	86	115	20	—	53	159	488	2 3	—	(b) 27.2 oz.
		Co. Kilkenny.	,,	406	5 8	6 10	18	17	16	13	11	21	21	18	17	20	17	6	195	192	3	—	—	51	153	484	2 8	—	
			,,	407	6 0	7 8	19	24	21	15	24	20	18	20	9	12	17	8	207	133	68	6	4	59	177	488	2 4	1	(c) 2,958 Points
			,,	408	5 12	6 13	23	19	15	15	13	17	17	18	7	16	8	3	171	86	82	3	1	55	165	415	2 3	1	
2	116	*Light Sussex* Sister-in-Charge,	—	481	6 0	7 10	23	24	19	17	17	17	19	13	15	13	11	8	196	160	35	1	—	65	195	487	2 5	—	(a) 1,144 Eggs
		St. Mary's Abbey,	—	482	5 12	7 8	12	19	20	13	14	9	22	15	17	8	1	5	155	147	7	1	6	51	153	356	2 8	—	
		Glencairn,	—	483	5 14	7 9	14	25	22	21	19	21	22	24	20	19	12	10	229	187	41	1	—	60	180	557	2 4	—	(b) 28.1 oz.
		Co. Waterford.	—	484	6 0	6 14	16	17	14	15	12	18	22	19	22	22	17	1	195	148	45	2	—	47	141	472	2 4	—	
			—	485	5 8	6 2	—	4	19	2	—	18	22	21	19	22	7	3	137	133	4	—	—	23	69	329	2 8	—	(c) 2,762 Points
			—	486	5 9	6 6	20	20	17	15	23	22	25	20	22	22	17	9	232	209	23	—	3	57	171	561	2 5	—	
3	102	*Light Sussex* Mrs. M. Comerford,	Jan. 23	355	5 3	5 14	20	21	21	22	21	25	22	22	24	19	18	7	242	171	69	2	4	62	186	577	2 4	—	(a) 1,065 Eggs
		Lamogue,	,,	356	5 6	6 4	18	18	19	19	17	16	15	16	16	8	10	3	175	174	1	—	—	55	165	426	2 9	—	
		Windgap,	,,	357	5 2	5 8	16	19	21	18	20	18	20	21	11	18	6	6	194	178	15	1	—	56	168	472	2 5	—	(b) 28.9 oz.
		Co. Kilkenny.	,,	358	5 10	7 8	21	23	20	18	17	21	19	20	15	17	11	3	205	205	—	—	1	64	192	503	2 8	—	
			,,	359	5 6	5 9	21	16	18	19	14	16	18	19	17	14	10	1	183	179	4	—	—	55	165	446	2 6	—	(c) 2,592 Points
			,,	360	5 8	8 0	13	8	6	13	11	4	2	—	—	5	—	4	66	62	4	—	—	27	81	168	2 8	—	
4	112	*Light Sussex* Sister-in-Charge,	Jan. 10	415	5 7	6 0	—	6	19	22	23	23	23	22	12	23	17	7	197	144	53	—	—	25	75	466	2 4	—	(a) 1,162 Eggs
		St. Martha's College,	,,	416	5 4	6 2	—	—	—	23	25	26	21	22	8	16	17	2	160	68	91	1	1	—	—	350	2 3	1	
		An Uaimh,	,	417	5 8	7 6	—	22	24	23	22	23	25	20	14	8	14	10	205	196	9	—	1	46	138	486	2 7	—	(b) 27.0 oz.
		Co. Meath.	Feb. 16	418	5 0	7 2	15	25	21	19	20	20	21	16	14	12	11	5	199	11	94	94	2	3	9	234	2 0	—	
			Jan. 10	419	5 8	6 15	21	24	19	17	18	16	19	21	17	20	18	9	219	107	103	9	—	56	168	522	2 3	—	(c) 2,468 Points
			,,	420	5 2	6 7	—	16	20	21	22	21	23	20	13	19	1	6	182	180	2	—	7	36	108	410	2 7	—	
5	104	*Light Sussex* Sister-in-Charge,	March 18	367	5 0	7 2	—	23	24	20	21	18	21	18	17	3	4	5	174	159	13	2	1	45	135	398	2 6	—	(a) 1,006 Eggs
		School of Dom. Science,	,,	368	5 0	7 2	—	—	11	23	18	23	14	15	17	14	10	7	152	101	49	2	4	9	27	329	2 5	—	
		Dunmanway,	,,	369	5 1	7 12	—	—	10	13	—	23	13	24	13	13	11	—	120	107	12	1	—	10	30	272	2 6	1	(b) 27.7 oz.
		Co. Cork.	Feb. 17	370	5 5	6 2	20	20	20	18	9	15	16	17	15	7	11	5	173	94	76	3	1	58	174	419	2 4	—	
			,,	371	5 7	8 4	19	23	23	19	20	22	15	22	22	11	18	5	219	171	47	1	—	64	192	534	2 5	—	(c) 2,364 Points
			,,	372	5 6	7 7	18	24	20	20	17	17	18	10	2	13	9	—	168	148	18	2	1	60	180	412	2 5	--	

SECTION VI.—ANY OTHER UTILITY BREED—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1944	No. of Bird	Weight: On Arrival (lb. oz.)	Weight: At Close of Test (lb. oz.)	Production per Period: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs (oz. dr.)	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
6	111	*Light Sussex*	Jan. 23	409	5 2	5 14	—	—	12	11	16	20	18	16	14	13	11	8	139	64	71	4	—	11	33	313	2 3	3	(a) 1,030 Eggs
		Mrs. M. Keatley,	,,	410	5 4	6 5	2	26	12	22	10	23	12	15	14	15	16	—	167	20	121	26	—	32	96	340	2 1	1	
		Boakfield,	,,	411	5 8	5 12	15	22	19	22	18	20	17	13	6	9	4	3	168	100	8	—	5	56	168	395	2 6	—	(b) 26.5 oz.
		Ballytore,	,,	412	5 6	6 0	—	—	18	20	23	28	23	15	13	14	14	—	168	110	56	2	—	16	48	376	2 4	—	
		Co. Kildare.	,,	413	5 5	6 14	14	23	15	–	20	25	25	20	17	12	14	12	197	29	153	15	—	44	132	444	2 2	—	(c) 2,325 Points
			,,	414	5 0	5 9	11	23	22	21	22	20	21	14	18	16	3	—	191	141	50	—	—	56	168	457	2 5	2	
7	107	*Light Sussex*	Feb. 1	385	5 7	7 5	—	4	23	22	21	24	24	17	16	15	13	3	182	166	16	—	2	27	81	416	2 6	—	(a) 946 Eggs
		Sister-in-Charge,	,,	386	6 1	7 8	23	2	21	22	4	10	24	19	14	22	14	5	180	156	24	—	—	46	138	447	2 5	3	
		Coolarne R.D.E. School,	,,	387	5 0	6 9	10	24	20	17	19	17	16	12	15	18	5	3	176	165	11	—	—	54	162	432	2 8	—	(b) 28.5 oz.
		Athenry,	,,	388	5 8	6 14	—	—	12	19	18	21	21	22	23	16	15	8	175	174	1	—	—	12	36	401	2 9	—	
		Co. Galway.	,,	389	5 2	7 14	26	22	21	7	4	9	17	10	10	13	2	3	144	111	32	1	—	68	204	372	2 4	—	(c) 2,286 Points
			,,	390	5 0	D	22	21	16	15	13	2	—	D	—	—	—	—	89	15	67	7	—	54	162	218	2 1	—	
8	115	*Light Sussex*	Feb. 15	445	5 14	6 14	12	16	16	15	13	17	18	19	17	15	13	7	178	177	1	—	18	44	132	388	2 9	—	(a) 1,024 Eggs
		Mrs. K. Cuddihy,	,,	446	5 4	7 9	2	20	22	21	19	19	22	23	18	18	11	7	202	191	11	—	3	44	132	475	2 6	—	
		Hillside P.F.,	,,	447	5 9	7 1	—	—	6	20	19	21	25	12	15	14	15	1	148	138	10	—	—	6	18	332	2 7	1	(b) 28.1 oz.
		Glenmore,	,,	448	5 0	6 8	25	7	—	—	8	25	16	20	18	13	12	12	156	11	114	31	—	23	69	302	2 1	—	
		Co. Kilkenny.	,,	449	5 9	6 9	25	12	24	12	—	19	22	21	15	16	19	—	185	177	7	1	2	60	180	457	2 7	1	(c) 2,260 Points
			,,	450	5 14	7 0	24	5	—	—	7	25	13	23	20	14	20	4	155	15	114	26	2	25	75	306	2 1	—	
9	106	*Light Sussex*	Jan. 28	379	5 12	6 8	—	—	—	—	9	23	13	16	11	15	16	3	106	34	67	5	2	—	—	228	2 3	1	(a) 950 Eggs
		Mrs. J. Hely-Hutchinson,	,,	380	6 0	6 6	21	23	21	20	18	22	21	23	16	18	16	5	224	45	171	8	1	63	189	532	2 2	—	
		Lissen Hall,	,,	381	6 5	7 9	8	—	—	—	11	12	17	13	14	11	7	4	97	61	33	3	—	6	18	216	2 4	1	(b) 26.8 oz.
		Swords,	,,	382	6 2	6 8	19	6	22	19	15	20	22	14	1	17	4	10	169	134	33	2	—	46	138	411	2 5	2	
		Co. Dublin.	,,	383	5 14	7 2	—	—	22	22	21	23	16	15	6	—	10	3	138	114	24	—	—	22	66	311	2 5	—	(c) 2,233 Points
			,,	384	6 6	6 12	23	20	20	19	17	19	19	18	19	17	19	6	216	188	28	—	1	63	189	535	2 4	—	
10	108	*Light Sussex*	Feb. 16	349	5 14	7 2	—	10	24	21	25	24	26	22	17	19	18	9	215	153	62	—	—	34	102	510	2 5	—	(a) 950 Eggs
		Mrs. W. O'Neill,	,,	350	5 10	6 0	—	–	14	16	16	24	15	18	9	11	10	—	133	85	46	2	—	14	42	297	2 4	—	
		Killeen House,	,,	351	5 12	7 0	19	8	—	14	19	7	14	20	16	15	15	1	148	143	5	—	—	27	81	354	2 6	1	(b) 27.6 oz.
		Ballybricken,	,,	352	5 8	7 2	3	24	21	23	18	20	23	19	12	—	—	—	163	144	19	—	1	48	144	372	2 5	—	
		Grange,	,,	353	5 0	7 12	—	5	22	21	18	20	5	—	—	—	—	—	91	69	22	—	—	27	81	209	2 4	—	(c) 3,205 Points
		Co. Limerick.	,,	354	5 6	5 14	17	14	—	17	19	22	22	25	23	18	19	4	200	158	39	3	—	28	84	463	2 5	—	

D = Dead.

SECTION VI.—ANY OTHER UTILITY BREED—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1944	No. of Bird	Weight: On Arrival (lb. oz.)	Weight: At Close of Test (lb. oz.)	Production per Period: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs (oz. dr.)	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
11	113	*Light Sussex* Sister-in-Charge,	Jan. 29	421	5 3	7 2	—	—	11	15	22	22	21	24	22	15	14	5	171	63	102	6	3	11	33	365	2 3	—	(a) 979 Eggs
		St. Martha's College,	Jan. 6	422	5 0	6 4	18	20	21	17	16	20	22	10	21	16	7	6	194	96	90	8	—	55	165	455	2 3	1	
		An Uaimh,	Jan. 29	423	5 0	6 14	—	—	—	18	27	22	23	19	13	17	11	9	159	54	104	1	1	—	—	350	2 3	—	(b) 26.5 oz.
		Co. Meath.	Jan. 14	424	5 0	6 5	22	1	—	20	18	12	13	15	12	14	—	3	130	31	89	10	—	18	54	273	2 2	2	
			Jan. 29	425	5 1	7 2	—	—	—	12	25	22	21	10	14	15	11	4	134	123	10	1	—	—	—	295	2 7	2	(c) 2,178 Points
			Jan. 14	426	5 0	7 0	—	—	2	19	21	21	24	24	22	25	24	9	191	92	98	1	—	2	6	440	2 4	—	
12	114	*Light Sussex* Mrs. M. Nagle,	Feb. 10	427	5 9	7 2	24	11	18	21	20	23	27	15	21	13	17	12	222	4	116	102	—	14	42	271	2 0	1	(a) 1,046 Eggs
		Springmount,	,,	428	5 10	6 15	19	19	19	18	12	18	14	10	5	2	1	—	132	90	41	1	9	57	171	302	2 4	—	
		Mallow,	,,	429	6 5	7 11	18	22	20	20	19	20	24	13	19	15	10	7	207	166	39	2	1	59	174	497	2 4	2	(b) 25.4 oz.
		Co. Cork.	,,	430	5 13	6 10	16	6	23	11	22	14	19	15	14	14	12	2	168	66	101	1	1	45	135	405	2 3	1	
			,,	431	5 8	6 14	22	16	12	7	12	11	9	9	3	5	9	3	118	6	103	9	39	47	129	185	2 0	—	(c) 2,124 Points
			,,	432	6 0	6 1	24	24	20	21	18	18	23	17	12	16	—	6	199	25	165	9	—	63	189	464	2 1	2	
13	103	*Light Sussex* Mrs. K. O'Brien,	Feb. 3	361	5 0	6 7	—	14	20	18	14	16	21	21	22	19	21	10	196	22	165	9	2	33	99	450	2 2	—	(a) 936 Eggs
		Ballykilmurry,	,,	362	5 6	6 14	14	20	21	19	19	11	—	—	—	3	2	5	114	65	43	6	—	49	147	275	2 3	—	
		Tullamore,	,,	363	5 10	7 3	20	12	19	17	10	12	16	3	—	—	—	2	111	2	85	24	—	36	108	211	2 0	—	(b) 25.2 oz.
		Offaly.	,,	364	5 0	5 8	20	18	19	16	11	21	22	21	23	18	19	10	218	9	183	26	—	43	129	467	2 1	—	
			,,	365	5 2	7 6	2	19	20	18	17	20	11	5	3	3	—	—	118	85	31	2	1	41	123	272	2 4	—	(c) 2,052 Points
			,,	366	5 8	6 4	20	18	20	20	21	18	24	19	3	7	8	1	179	9	151	19	2	52	156	377	2 1	—	
14	105	*Light Sussex* Miss B. Roche,	February	373	5 14	4 8	21	22	19	20	18	20	21	21	16	3	—	—	181	36	142	3	—	61	183	420	2 2	—	(a) 924 Eggs
		Cleariestown,	,,	374	5 14	5 0	—	5	20	18	18	20	17	17	16	2	—	—	133	6	87	40	—	24	72	210	2 0	—	
		Co. Wexford.	,,	375	5 10	D	20	19	22	20	21	25	24	d16	—	—	—	—	167	135	30	2	—	59	177	389	2 4	—	(b) 25.8 oz.
			,,	376	5 8	5 0	20	17	21	19	17	19	22	19	20	13	10	—	197	44	126	27	3	35	105	389	2 2	—	
			,,	377	5 14	D	22	13	8	—	—	1	—	—	—	—	—	D	44	6	17	21	—	22	66	68	1 15	—	(c) 1,946 Points
			March	378	5 11	6 8	—	24	18	21	23	24	16	22	16	20	12	6	202	153	49	—	5	42	126	470	2 4	—	
15	117	*Barred Rock* Mrs. E. A. Henderson,	Feb. 12	433	6 0	7 5	—	—	13	22	23	22	26	24	23	24	20	3	200	1	150	49	5	8	24	314	2 0	—	(a) 981 Eggs
		Ardrum,	Feb. 25	434	6 0	5 13	—	5	5	—	4	21	15	13	5	—	—	—	68	22	44	2	—	10	30	142	2 3	—	
		Inniscarra,	Feb. 12	435	6 7	7 12	—	—	—	—	7	18	25	25	23	22	23	12	155	44	104	7	2	—	—	344	2 3	—	(b) 25.6 oz.
		Co. Cork.	,,	436	7 6	7 8	12	—	14	21	12	20	21	24	22	23	10	—	179	138	40	1	—	26	78	415	2 5	—	
			,,	437	7 2	7 4	—	4	13	—	17	21	26	24	24	25	12	4	170	9	98	63	—	17	51	243	2 0	—	(c) 1,924 Points
			,,	438	6 8	7 0	15	13	22	15	7	22	23	21	25	20	20	6	209	54	143	12	6	42	126	466	2 2	—	

D = Dead.

SECTION VI.—ANY OTHER UTILITY BREED—*continued.*

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1944	No. of Bird	Weight: On Arrival (lb. oz.)	Weight: At Close of Test (lb. oz.)	Production per Period: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs (oz. dr.)	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
16	109	*Light Sussex* Miss C. Rourke,	Jan. 19	397	5 6	6 9	19	23	20	21	22	23	24	23	23	23	24	10	255	27	198	30	—	40	120	544	2 1	—	(a) 812 Eggs
		Clonaheenogue,	„	398	5 8	D	22	19	19	13	D2	—	—	—	—	—	—	—	75	67	8	—	—	60	180	210	2 5	—	
		Lusmagh,	„	399	5 0	6 10	—	15	19	19	22	21	20	22	21	18	14	6	197	116	81	—	—	34	102	466	2 4	—	(b) 26.9 oz.
		Banagher,	„	400	5 1	D	3	23	22	20	3	—	D	—	—	—	—	—	71	69	2	—	—	48	144	190	2 6	—	
		Offaly.	„	401	5 0	6 0	—	11	16	18	20	23	21	18	10	12	15	—	164	154	9	1	—	27	81	379	2 7	1	(c) 1,899 Points
			„	402	5 6	D	—	—	10	18	19	3	—	D	—	—	—	—	50	26	24	—	—	10	30	110	2 4	—	

D = Dead

FRUIT CROP REPORT, 1945.

The year 1945 will inevitably be associated with previous disastrous fruit crop years such as 1938. Seldom indeed was the fruit prospect more promising in April and seldom was its later destruction so widespread.

January was dry and cold with an icy snowbound week towards the end of the month, which left most trees and bushes rather liable to respond later to the stimulative effects of an early and warm Spring.

Cold weather with frost and snow continued into February, but March was dry and mild with little frost, and fruit trees were therefore early on the move. April was dry and exceptionally fine, although frosts of considerable severity occurred during the month. The early development and blossoming of fruit trees was overtaken by sudden and severe frosts between the 29th April and 1st of May and the crop prospects reduced to negligible proportions.

Of the soft fruits Gooseberries were badly hit in all districts while Strawberries were considerably reduced. The variety Royal Sovereign was reported to have been much more seriously damaged than the more leafy Huxley Giant. In the Raspberry growing districts of County Meath and also in other areas the first formed blossoms were damaged on most holdings but secondary shoots produced moderate crops of inferior quality fruit later in the season.

Apple trees had blossomed about three weeks earlier than usual and except in very sheltered districts or favoured sites were caught by the late April frost. Pears and plums on walls escaped in some sheltered locations but generally were reported to be a mere fraction of normal.

The wet, unsettled weather experienced during June and July favoured the development of fungoid diseases generally. Apple Scab and American Gooseberry Mildew were reported to have been particularly difficult to control. The reports did not indicate that insect pests were unduly prevalent although in some southern counties Apple Sawfly was considered to be on the increase.

During September gales and storms were reported but the damage done to the then much reduced apple crop was not serious and Harvesting was undertaken without undue loss.

Table showing in a general way the nature of the yields obtained in each county.

County	Gooseberries	Strawberries	Raspberries	Loganberries	Red and White Currants	Black Currants	Apples	Pears	Plums	Damsons	Other Fruits
Carlow	Very Bad	Very Bad	Good	Good	Bad	Very Bad	Very Bad	Very Bad	Very Bad	Very Bad	Bad
Cavan	Very Bad	Bad	Good	Good	Very Bad	Very Bad	Very Bad	Bad	Very Bad	Very Bad	Very Bad
Clare	Below Average	Bad	Bad	Good	Average	Bad	Bad	Average	Below Average	Bad	Fair
Cork	Very Bad	Bad	Average	Average	Average	Very Bad	Very Bad	Very Bad	Very Bad	Very Bad	Bad
Donegal	Bad	Good	Average	Average	Average	Fair	Bad	Bad	Average	Fair	Good
Dublin	Bad	Bad	Average	Average	Average	Bad	Very Bad	Bad	Very Bad	Very Bad	Average
Galway .. .	Good	Fair	Good	Good	Average	Bad	Bad	Average	Bad	Fair	Good
Kerry .. .	Very Bad	Very Bad	Bad	—	—	Bad	Very Bad	Very Bad	Very Bad	Bad	Bad
Kildare ...	Very Bad	Very Bad	Very Bad	Bad	Fair	Very Bad	Very Bad	Bad	Very Bad	Very Bad	Very Bad
Kilkenny	Very Bad	Fair	Bad	Average	Bad	Bad	Very Bad	Very Bad	Very Bad	Very Bad	Bad
Laoighis	Bad	Bad	Bad	Bad	Bad	Bad	Bad	Very Bad	Very Bad	Very Bad	Very Bad
Leitrim	Very Bad	Very Bad	Bad	—	Very Bad	Very Bad	Very Bad	Very Bad	Very Bad	Very Bad	Very Bad
Limerick	Very Bad	Fair	Average	Bad	Bad	Very Bad	Very Bad	Very Bad	Very Bad	Very Bad	Bad
Longford	Bad	Bad	Average	Average	Bad	Very Bad	Very Bad	Very Bad	Very Bad	Very Bad	Bad
Louth	Good	Good	Average	Very Good	Fair	Bad	Very Bad	Good	Bad	Bad	Good
Mayo	Bad	Bad	Average	Good	Average	Bad	Very Bad	Good	Bad	Bad	Bad
Meath	Very Bad	Bad	Very Bad	Good	Average	Very Bad	Very Bad	Very Bad	Very Bad	Very Bad	Very Bad
Monaghan ..	Bad	Bad	Bad	—	Average	Very Bad	Very Bad	Bad	Very Bad	Very Bad	Bad
Offaly	Very Bad	Bad	Very Bad	Average	Good	Very Bad	Very Bad	Very Bad	Very Bad	Very Bad	Very Bad
Roscommon ..	Bad	Bad	Bad	Bad	Bad	Bad	Bad	Bad	Bad	Bad	—
Sligo	Bad	Bad	Bad	Bad	Very Bad	Very Bad	Very Bad	Very Bad	Bad	Bad	Bad
Tipperary (N R.)	Bad	Bad	Bad	Average	Average	Bad	Very Bad	Very Bad	Very Bad	Very Bad	Bad
Tipperary (S R)	Bad	Bad	Bad	Average	Bad	Bad	Very Bad	Very Bad	Very Bad	Very Bad	Bad
Waterford ...	Bad	Bad	Average	Average	Average	Bad	Very Bad	Bad	Very Bad	Very Bad	Bad
Westmeath ...	Bad	Fair	Average	Average	Bad	Bad	Very Bad	Average	Very Bad	Very Bad	Bad
Wexford	Bad	Bad	Bad	Average	Bad	Bad	Bad	Bad	Bad	Bad	—
Wicklow	Bad	Bad	Average	Average	Good	Bad	Bad	Average	Bad	Bad	Good

MARKET PRICES.

Apples.

Dessert Varieties:	Early	10/- to 20/- per stone
	Mid-Season	15/- to 25/- „ „
	Late	20/- to 30/- „ „
Culinary Varieties:	Early	5/- to 12/- „ „
	Mid-Season	10/- to 15/- „ „
	Late	20/- to 25/- „ „
	in bulk from packing firms	48/- to 56/- per cwt.

Culls and Crab Apples for manufacturing purposes 17/- to 20/- per cwt.

Cider Fruit .. .. 14/- per cwt.

Plums	12/- to 45/- per 12 lb. chip
Damsons ..	10/- to 23/- „ „ „

Jam Fruit: *Plums*—36/- to 65/4 per cwt. according to variety
Damsons—60/- per cwt.

Gooseberries.

10/- to 20/- per chip of about 12 lbs.
Jam Fruit 48/6 per cwt.

Strawberries.

2/6 to 7/6 per lb. for choice fruit in early June; later 1/6 to 2/3 and up to 4/6 per lb.
Jam Fruit 74/8 to 79/4 per cwt.

Raspberries.

10d. to 2/3 per lb.
Jam Fruit 66/- per cwt.

Loganberries.

1/8 to 1/6 per lb.
Jam Fruit 60/- per cwt.

Black Currants.

10d. to 1/9 per lb.
Jam Fruits 84/- per cwt.

Red and White Currants.

10d. to 1/2 per lb.
Jam Fruit 54/8 per cwt.

Blackberries.

37/4 per cwt.

Bilberries.

64/- to 80/- per cwt.

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the Valuation Code, to provide a uniform basis for the assessment of the county cess and other Grand Jury charges. Hitherto, the county rates had been levied without reference to any uniform system whatever, the basis of taxation varying in different parts of the country. In some regions it was by the old civil division of ploughlands varying in size and value but rated at an equal sum; or, again, by townlands, of which the assumed areas bore no defined proportion to their actual contents.[8] A Select Committee, appointed by the House of Commons, had reported in 1815 that "some mode should be taken to render Grand Jury assessments more equal by correcting the defects arising from apportioning the county rate according to old surveys calculated on the measure of land formerly deemed profitable".[9]

It was not practicable, however, to give effect to the recommendation thus made until the Boundary and Ordnance Surveys had determined and defined the limits and areas of the divisions and sub-divisions of the country. These undertakings were sufficiently advanced in 1830 to enable a start to be made with the General Valuation initiated by the Act of 1826. It was the purpose of this Act and the amending Act of 1836 to ensure, as already indicated, that the relative value of townlands within any county, though ascertained at different periods, and the relative value of townlands of different and distant counties should be the same. To achieve this object the Legislature embodied in these Acts, as indeed in all subsequent Acts, a scale of prices of agricultural produce which was to be the standard of valuation for the whole country; that included in the Acts of 1826 and 1836 represented the average market prices for the year 1816 or 1817[10]. Though the details of the manner in which the annual value of the land was to be estimated were not indicated by the Act, the Lord Lieutenant was empowered to issue such instructions as were necessary for its execution. Other statutory provisions authorised the Commissioner of Valuation to appoint "Valuators" experienced in the surveying of lands and houses and who were suitable in other relative connections.

Instructions to Valuators. Though this last provision pre-supposed the existence of fully qualified Valuators, Griffith found it necessary, in the first instance, to establish a peripatetic "School of Valuation" in which he adumbrated the principles on which the proposed valuation of land and houses was to be made[11]. Later, with the approval of the Lord Lieutenant, these principles were embodied in a code of "Instructions" written by Griffith and regarded as a classic, which defined with great minuteness the nature of the valuators' duties. The first book of Instructions was issued in 1833; later editions, synchronising with new requirements or amended legislation, appeared in 1836, 1839, and 1853. With the last edition a geological map of Ireland was supplied[12]. From the Instructions dated September 1839[13], supplemented by "Additional" Instructions issued in 1844, the principles under which the "Townland Valuation" was made can be determined. Distinct sections are devoted to the "Description" and "Arrangement" of

soils which are specified under four heads: argillaceous or clayey, siliceous or sandy, calcareous or limey, and peaty; these heads are further subdivided into two to four varieties. A further section provides for the "Classification" of soils with reference to their respective values, of which tables are provided; under this head, soils are divided into classes—*e.g.* prime land, medium land, poor land (clayey, shallow or stony arable, cultivated moors or bogs, and natural pastures and bogs). Paragraph 23 directs that, in ascertaining the value of land contained within the division of the townland, the valuator was carefully to examine the whole townland, independent of its superficial appearance: "The nature and depth of the soil and the quality of the subsoil are to be the principal grounds on which he is to form his judgment of the value of the land"[14]. Accurate descriptions of the results of such examination were to be entered in the Field Books specially designed for this purpose. Directions were also given that allowances were to be made "on the spot" in regard to elevation, steepness, exposure to injurious winds, different varieties of soil occurring in small patches or any other peculiar local circumstance. The methods to be adopted in valuing houses, mills and factories were likewise set out in great detail.

The system to be adopted in carrying into effect the enactment contained in the ninth Section of the Act of 1836 respecting the standard by which the valuation was to be made—the scale of prices of agricultural produce—is given in paragraph nine of the Instructions. Previous to commencing the valuation in the year 1830, Griffith had ascertained that the general average prices of agricultural produce throughout Ireland, for the five years previous to that period, was one-eighth or 2s. 6d. per pound higher than the general average prices contained in the Act. Having also ascertained the fair letting value of land at the commencement of the valuation, he deducted therefrom 2s. 6d. in the pound for the purpose of reducing the value of land at that time to suit the schedule of prices contained in the Act. By this means the relative scale of value, intended by the Legislature, would be preserved. Valuators, accordingly, were notified of the procedure thus laid down.

On the lines indicated, the valuation of eighteen counties was completed by March 1844; those in the process of valuation were Clare, Galway, Kilkenny, Leix (then Queen's County), Mayo, Offaly (then King's County), Waterford, Wexford and Wicklow; Dublin, Cork, Kerry, Limerick, and practically all Tipperary remained to be valued.

Inquiry into Townland Valuation. In July 1844, a Select Committee of the House of Commons (see footnote 10) was appointed to inquire whether the Townland Valuation, in progress, could be utilised for the imposition of the Poor Rate and other local rates. Before indicating the recommendations of this Committee it should be recalled that, under the Poor Relief Act passed in 1838 (1 & 2 Vict., c. 56), a distinct valuation, based on a different principle to that of the Townland Valuation, had been authorised for the purpose o

the assessment of the Poor Rate. This valuation was placed under the direction of the Poor Law Guardians, who appointed their own local valuators, and was completed about the year 1842. The provisions of the Poor Relief Act, sections 63-65, which accorded substantially with the law of rating in England, directed that each occupier was to be rated separately on the basis of the "net annual value of the land to let"[15].

Two distinct valuations, therefore, had come into existence for different purposes, based on different principles and in respect of different units—the townland and the holding or tenement. It was to remedy the confusion and inconvenience caused by this exceptional state of affairs, that the Inquiry of 1844 was instituted. After a minute examination of the position the Committee found that in its actual form the Townland Valuation could not be made available for the assessment of the Poor Rate for the following reasons: (1) it contemplated no smaller division than a townland; (2) it failed to indicate the positive letting value required by the Poor Relief Act; (3) much property liable to Poor Rates, but not to County Rates, had been omitted[16]. As regards the Valuations which had been made for the purposes of the Poor Relief Act, the Committee considered that, though framed upon a sound principle, it was not sufficiently uniform to afford a fair basis for the imposition of the County Rates[17]. In these circumstances, the Committee recommended to Parliament that there should be only one valuation for all purposes of Local Taxation in Ireland; that it should distinguish the value of each tenement separately according to the "net annual value to let"; and that the Townland Valuation should be discontinued.

The Tenement Valuation. These recommendations were not adopted in their entirety in the legislation which followed in 1846 (9 & 10 Vict., c. 110)[18]. The Tenement Valuation, under the direction of the Commissioner of Valuation, was limited to certain counties—Dublin, Cork, Kerry, Limerick, Tipperary and Waterford. Distinct principles of valuation for Poor Law purposes and County Rates were prescribed by different sections. Section 9 provided that a valuation should be made of all rateable tenements, for Poor Law purposes, upon an estimate of the net annual value at which the same would let from year to year subject to rates and taxes and certain specified expenses being paid by the tenant. On the other hand Section 39 provided that, "in addition to the Tenement Valuation according to the net annual value, an additional valuation for the purpose of county assessment shall be made with reference to the average prices of agricultural produce . . ." according to the scale specified in the Act. This was the same scale as had appeared in the Acts of 1826 and 1836[19]. As regards the counties which had been valued under former Acts, Section 78 provided for their revaluation under the provisions of the cited Act, if the Grand Juries should so require. Meanwhile the valuations already made, in respect of such counties, were to remain.

Six years later, in 1852, the foregoing Act was superseded by the 15 & 16 Vict., c. 63, which authorised for the entire country one uniform valuation according to tenements[20]. This valuation when completed was to be used for all Grand Jury rates, city, town and parish rates, as for Poor Law assessments. Different principles of valuation for land and houses, however, were to be followed. As regards the former, Section 11 directed that the valuation should be made on an estimate of the net annual value of land "with reference to the average Prices of the several Articles of agricultural produce" therein specified. The scale provided differed, for the first time, from that appearing in previous Acts[21]. As regards houses and buildings, the valuation was to be made on an estimate of the net annual value, or rent for which the same might be expected to let from year to year—all rates, taxes, and other expenses (except tithe rent-charge) being paid by the tenant. Numerous Acts affecting details were passed in subsequent years, but none altering the principles of the Statute.

By virtue, therefore, of the legislation of 1846-52, two Valuations may be said to have been scrapped—the Townland Valuation and the Poor-Law Guardians' Valuation. The former had been completed for Connacht, Leinster (County Dublin excepted), and Ulster; according to evidence given before the Select Committee of 1869 (footnote 11) this Valuation had cost £160,000. There have survived, however, features of the Townland Valuation of great importance—the Field Books describing the soils and sub-soils of the townlands and the corresponding maps. The valuations which these expressed were concerned *solely*, it may be emphasised, with the quality and productivity of the soil and, for this reason, may still be considered to furnish information of practical value.

Kane's Work on the Valuation Maps

Kane's address to the Academy was given in 1848, but the work had been in progress for nearly two years previously. On 16 November, 1846, we find him writing for one copy each of all the Survey County Index Maps, one copy of the Map of Elevations published in connection with the Land Tenure Commissioners Report, and four copies of the map published to accompany the Railway Commissioners' Report. In June and December 1848 and April 1849 he requested copies of the six-inch maps and the Index maps of various counties, as many as 10 copies of each index being required. At first the Board of Ordnance supplied the maps without question; later they inserted a proviso that the maps should be returned as soon as the object for which they were required had been attained[22].

In his Annual Report as Director of the Museum of Irish Industry for 1853 (dated 26 January 1854)[23] Kane stated that the valuation maps of all the Irish counties were complete, with the exception of the colouring of part of Munster and of county Dublin—which, as we have seen, were not included in the original valuation. He continued: "The valuation of the several counties

is now being coloured in on the general (Railway Commissioners') map of Ireland from the separate valuation maps of the Ordnance Indexes' scales. By this means a most interesting general view of the distribution of values of land over the entire country will be obtained. The references to these valuation maps by persons wishing to purchase properties in Ireland, or connected with the management of landed property, is becoming very frequent, and the remarkable definiteness and utility of the information they supply is fully recognized." In a return, dated 22 May 1854, of information required by order of the House of Commons[24], Kane wrote that the valuation maps of nearly all the Irish counties were ready for publication; only small portions of the Munster counties of Clare, Cork, Kerry, Limerick and Tipperary remained to be completed.

A Guide to the Museum published in 1858[25] states (p. 11) that there were deposited in the offices of the Museum a series of coloured maps showing the distribution of the values of land in the Irish counties according to the official valuation. The Report of the Commission on the Royal Dublin Society, the Museum of Irish Industry and the System of Scientific Instruction in Ireland dated 1862[25] also refers (p. 14) to the presence of the coloured valuation maps in the Museum. This is the last reference to these maps; they are not mentioned in a return made by Kane to an order of the House of Commons in 1864[26], nor in a catalogue[27], published in 1872, of the Royal College of Science for Ireland, into which teaching institution the Museum of Irish Industry developed.

Kane's detailed colour scheme. No trace of the coloured maps has been found, though search has been made in all likely Government Departments and Institutions both in Dublin and in London by courtesy of the Governments concerned. Some of Kane's work remains, however, for in the Science Library of University College, Dublin—formerly the Library of the Royal College of Science for Ireland and of the Museum of Irish Industry—there is a set of six-inch maps of Ireland which once belonged to the Museum. Inspection of these maps shows that, on all the townlands of most of the counties, there is written in pencil a colour related to the five general colours mentioned by Kane in his address to the Academy. There is a general but not exact correspondence as regards completed counties with Kane's 1854 Report to the House of Commons. Of the thirty-two counties, Clare and Cork only have not been touched; there are a few entries for Limerick, and Kerry and Kildare are but partly finished. A number of the entries for Dublin have been erased and are indecipherable; otherwise the work is complete.

TABLE I

SIR ROBERT KANE'S SCHEME OF TINTS FOR LAND VALUES

Value per statute acre in shillings	Special Tint	General Tint	Class
0— 2	Black	Black ..	Waste lands
2— 4	Sepia	Brown ..	Soils of inferior value
4— 6	Burnt Umber		
6— 8	Vandyke Brown		
8—10	Indian Red ..		
10—12	Raw Sienna		
12—14	Yellow Ochre	Yellow and Green	Soils of medium value
14—16	Gamboge ..		
16—18	Sap Green ..		
18—20	Emerald Green		
20—22	Blue	Blue and Purple	Soils of superior value
22—24	Royal Blue ..		
24—26	Purple ..		
26—28	Crimson Lake	Red ..	Soils of "factitious" (artificial) value particularly when above 32 shillings per acre
28—30	Orange ..		
30—32	Venetian Red		
32—36	Carmine ..		
Exceeding 36	Vermillion ..		

NOTES

(*a*) The scheme for Wicklow and Kildare, apparently the first counties examined by Kane, differs slightly from that given above, which was subsequently used, in that carmine is employed for 26s. to 28s. per acre and vermillion for all values exceeding 32s. per acre.

(*b*) Griffith in his 1839 Instructions classified soils as follows:—

Prime	.. ..	30s. — 21s. 6d. per statute acre.
Medium	.. ..	21s. — 11s. 6d. ,,
Poor	.. ..	11s. downwards.

That these colours refer to Kane's original scheme becomes clear when the tints assigned to a sufficient number of townlands are compared with the corresponding value per acre deduced from the results of Griffith's first valuation[28]. The scale of values shown in Table I emerges; a scale which it will be seen is in line with the general outline given by Kane to the Academy. As explained in note (*a*) to the Table, the original scheme used by Kane for Wicklow and Kildare differs slightly from that finally adopted for the other counties.

In view of this difference it was thought advisable to check the colour scheme for all the counties; eventually some 2,500 townlands covering the whole country were examined. A few minor discrepancies, probably due to errors in calculations, were found; in addition there are a number of unexplained anomalies as regards the more highly valued townlands in the parish of St. Mary's (barony of Bantry, Co. Wexford).

Some difficulty was experienced in determining the particular valuation used by Kane for the counties not included in the original Townland Valuation, since there are original and revised (after appeal) figures available for the Tenement Valuations. Eventually, after a number of trials with the various figures, it was found that Kane generally employed the unrevised values given in what is known as the "Primary Valuation," which were based on the 1846 Act and became available in the early fifties. Dublin, however, was one of the first counties to be valued under this Act, and at the period in question there had been published figures revised after appeal (as laid down in the Act), and these Kane employed.

The Soil Maps

The information available in regard to the soil maps, with which Kane planned to supplement his valuation maps, is scanty. In April 1846, Kane wrote to Captain James, the first Director of the Irish Geological Survey[29], requesting the collection of specimens of every kind of soil and subsoil met with in each county during the progress of the survey[30]. It was some time, however, before the request could be granted; for on the 20 June 1846, James resigned, stating to the Director-in-Chief Sir Henry De la Beche[31]: "The powers and means which have been entrusted to me are insufficient to enable me to carry on the duties (of his post) in a satisfactory manner either to the public or to myself." In a further letter of the 24 July 1846 to Viscount Canning, the Chief Commissioner of Woods, James stated that, "in an interview with the Earl of Lincoln (then Chief Commissioner of Woods) which I had the honour to have in company with Sir Henry De la Beche and

Sir Robert Kane, His Lordship particularly directed me to afford every assistance to Sir Robert Kane, and he at the same time told that Gentleman that he was to look to me for all information to be collected in the Country and also for the specimens to be exhibited in the Museum in Dublin, of which he is Director, and moreover that he was to report me to His Lordship if I did not do my duty in a satisfactory manner." James went on to say that, from the directions he had since received from De la Beche, it was absolutely impossible for him to give the expected assistance to the Museum. De la Beche, in his reply to Canning, stated that the present funds of the Irish Survey were such as not to permit the systematic collection of soils without the Survey itself being greatly impeded, and he requested additional funds for the purpose. These funds were granted in September 1846; and, in November 1846, De la Beche wrote to Kane stating that he had asked the new Director of the Irish Geological Survey, Professor Oldham[32], to consult with him as to the manner in which the soil collections were to be made.

It was not, however, until February 1847 that 30 specimens of soils and subsoils from the county of Wicklow were forwarded to Kane. After that, he received regular samples until, by the middle of 1852, over 1,300 samples of soils and subsoils had been sent. There was, however, much friction with the Geological Survey--as early as 1846 a dispute arose in regard to the transfer of material to the Museum. Again, after Kane had addressed the Academy meeting (to which reference has been made above), Oldham criticised the scheme, stating that averaging of soil value over a whole townland was liable to lead to erroneous results. He also stressed the fact that the samples which Kane had analysed had been procured by officers of the Geological Survey under his (Oldham's) direction. Kane replied that the employment of the townland as the unit of valuation gave, on the whole, correct averages—particularly when the generalised maps were under consideration. He also stated that Oldham was "somewhat obscure" in his reference to the collection of soils, since that was being made by the Direction of the Chief Commissioner of Woods (footnote 2).

In 1851 De la Beche wrote to Oldham's successor, Jukes,[33] asking for a report on the time spent in collecting soil samples, and was informed that 10—15 per cent. of the period spent in field work was involved. Jukes also stressed the inconvenience and expense of making the collection, a complaint he repeated in his annual report for 1851. In his report for the following year he stated that with Kane's consent the collection of soil samples had been discontinued in July 1852, owing to "the very great hindrance it caused to the legitimate duties of the Survey and in the hope that some other arrangements might be made for it in the future."

Kane's report for 1858[23] also referred to the suspension of the collection of soil specimens, which had hindered the progress of his investigation. He believed, however, that "the collection of the soils, and of the necessary agricultural information regarding their localities, may be otherwise more conveniently obtained for the purposes of the Museum, and a provision to that effect is inserted in the estimates for the coming year." Actually the special arrangements which he hoped to make for the collection of samples under his own direction never matured.

In his return (mentioned above)[24] to the House of Commons, made in May 1854, Kane reported that the construction of the "agrological" maps was in progress. In all, 751 soil analyses had been made, covering Dublin, Kildare, Wexford, Wicklow, and part of Carlow, Kilkenny and Leix. Considerable progress had been attained in the construction of the half-inch maps embodying the analytical results, together with the general physical characters of the counties, and the map of Kildare was ready for publication. In this connection it had been necessary to contour the county half-inch maps using the elevations given in the six-inch maps. The descriptive memoirs which should accompany the soil maps could not, Kane reported, be completed until the geological memoirs of the respective localities prepared by officers of the Geological Survey became available for reference.

As with the valuation maps, this is the last definite reference to the progress of the soil maps. With the development of the teaching side of the Museum activities, the chemist attached to it could find no time for analytical work, so that the analysis of all the samples received before collection ceased was not completed. We find a reference to the soil maps of a few counties being with the valuation maps in the Museum in the Guide published in 1858 and in the Report of the 1862 Commission. In his evidence before this Commission (Report p. 92), Kane said: "We, therefore, never had anything to do with agriculture (in the Museum) except with regard to the chemical analysis of soils, the preparation of a series of maps showing the distribution of the values of land according to the Government valuation, and the forming of agronomical maps showing the distribution of soils in two or three counties. This latter was given up, as it was found to be attended with expense and embarrassment." The report[25], published in 1864, of a Select Committee on Scientific Institutions in Dublin stated (p. xiii) that "the construction of the agrological maps had been wholly given up, although the French Government has actively promoted the preparation of such maps since the Irish were projected; and already the maps of several departments have been published . . . perhaps by a reorganization of this (the chemical) department (of the Museum) it may be possible to resume it, as well as to afford aid to the Geological Survey in the analysis of minerals, rocks, etc."

No trace has been found of the soil maps of the few counties completed by Kane—they, like the valuation maps, have vanished and the work has gone for nothing. To his contemporaries Kane must have appeared uniquely successful in the eminence he achieved; yet in retrospect one wonders. The practical effect of his *Industrial Resources of Ireland* was killed by the famine; the collections he brought together for his Industrial Museum have been dispersed, and we have no such museum now; the college which he founded so that science might be taught with a view to its practical application has been closed, and the locusts have eaten the years of drudgery which he gave to the preparation of the soil and valuation maps. Something, however, still remains: the example which he set of patient unremitting toil. It is in the hope that these maps, the fruits of some of this toil, may be found that this article has been prepared; it may bring to the mind of some reader a recollection of coloured maps stored and forgotten.

The thanks of the authors are due to the Taoiseach and the Heads of various Irish and British Government Departments who arranged for searches to be made for the maps at the instance of the Irish Manuscripts Commission; also to the Directors of the Geological and Ordnance Surveys and to the staffs of the Valuation Office, of the National Library, of the Library of the Royal Irish Academy, and of the Science Library of University College, Dublin, for valuable assistance.

NOTES.

[1]For a general account of Kane's life and work and of the Museum of Irish Industry, see STUDIES, 1944, pp. 158 and 316.

[2]*Proceedings of the Royal Irish Academy*, 1847-50, 4, 230.

[3]The townland, like the barony, is one of the ancient land divisions of Ireland which existed under other names prior to the introduction of Christianity. There were 4 ploughlands in a ballybetagh or townland and 30 townlands in a barony. In the ordnance maps all names of smaller sub-divisions are discarded, and the term "townland" is applied to every such denomination, whether great or small; consequently, there is now a great variation in the area of townlands, ranging from about an acre up to thousands of acres. (See *Townland Index*, 1901, Introduction).

[4]Sir Richard John Griffith (1784-1878) was one of the great Irishmen who flourished in the first half of the nineteenth century. When Professor of Geology and Mining Engineer to the Royal Dublin Society (1812-22) he produced his famous geological map of Ireland. He was Engineer of the southern district roads from 1822 to 1846 and in charge of the Irish boundary survey between 1825 and 1846. He initiated the official valuation of Ireland, being Commissioner of Valuation from 1830 to 1868. He was long associated with the Irish Board of Public Works, of which he became Chairman.

[5]From the report of the Academy meeting (see footnote (2)), it would appear that maps relating to Wicklow and possibly Kildare were shown.

[6]Entitled "An Act to make Provision for the uniform Valuation of Lands and Tenements in the several Baronies . . . . and other Divisions of Counties in *Ireland* . . . ."

[7]Entitled "An Act to consolidate and amend the several Acts for the uniform valuation of Lands and Tenements in *Ireland* . . . ."

[8]*Cf. Report of Select Committee on the Survey and Valuation of Ireland*, 1824 (*Reports Committees*, 1824, 8; in the National Library).

[9]Quoted in Report referred to in previous note.

[10]See evidence of Griffith given before *Select Committee on Townland Valuation*, 1844. (*Reports Committees* (3), 1844, 7; in the National Library).

[11]Griffith: Evidence before *Select Committee on the General Valuation of Ireland*, 1869. (*Reports Committees*, (4), 1868-69, 9; in the National Library).

[12]*Instructions to the Valuators and Surveyors* appointed under the 15th and 16th Vict., Cap. 63, for the uniform Valuation of Lands and Tenements in Ireland. Alex. Thom: Dublin, 1853. (In the Valuation Office).

[13]*Instructions to the Valuators* appointed under the 6th and 7th Wm. IV., Cap. 84. Porter: Dublin, 1839.

[14]The following is Griffith's amplified account of the procedure followed: "It is the duty of the Valuators to separate each quality of land from the other by lines laid down on the map, each division being called a lot, and the valuators are directed to lay out each lot so that as far as possible it shall consist of one uniform quality. Having determined the boundary of the lot, the valuator then points it out to the assistant valuator both on the map and on the ground; they next proceed with great care to examine the lot, not by a superficial examination, but by digging up the surface, so as to ascertain the nature of the soil, its depth and the nature of the sub-soil; and the valuation is directed to be founded on these observations, and not on the surface appearance of the land, such appearances being very deceptive . . . . the object being that the quality of the ground, and not the state of cultivation, is the criterion on which the valuation is to be made . . . ."

[15]Griffith, giving evidence before the Select Committee of 1844 (footnote 10), stated that in reply to enquiries from Poor Law Guardians he had uniformly stated that the addition of one-third to his valuation would give very nearly the full rent value of the land under ordinary proprietary.

[16]Tithes, mines, fisheries and quarries which were not rateable to County Cess were rateable to the Poor Rate.

[17]"It was for the most part executed by persons of inferior skill." Report of the Select Committee, 1844 (footnote 10).

[18]Entitled "An Act to amend the Law relating to the Valuation of rateable Property in *Ireland*."

[19]The two land valuations were in fact related for Section 47 of the Act provided that when the Poor Law Valuation of an area had been completed, it should be reduced for other local assessments to the agricultural produce scale. Further, Griffith declared, in 1869, (footnote 11) that the principle throughout was to value according to a scale of agricultural prices, not according to rents.

[20]Entitled "An Act to amend the Laws relating to the Valuation of rateable Property in *Ireland*."

[21]The same scale appeared in the first three Acts of the code and may here be contrasted with that given in the Act of 1852.

	Per cwt. of 112 lbs. Acts: 1826, 1836, 1846			Per cwt. of 112 lbs. Act of 1852.		
	£	s.	d.	£	s.	d.
Wheat ..	0	10	0	0	7	6
Oats ..	0	6	0	0	4	10
Barley ..	0	7	0	0	5	6
Potatoes ..	0	1	7		--	
Butter ..	3	9	0	3	5	4
Beef ..	1	13	0	1	15	6
Mutton ..	1	14	6	2	1	0
Pork ..	1	5	6	1	12	0

It will be observed that potatoes disappeared from the scale in the Act of 1852; flax appeared in the place of this item, the price quoted being £2 9s. per cwt. of 112 lbs. Wool was omitted from all the Acts.

[22]Correspondence in Ordnance Survey files.

[23]*First Report of the Department of Science and Art*, p. 459. (In the Science Library of University College, Dublin.)

[24]*Accounts and papers* (20), 1854, 58. (In the National Library, Dublin).

[25]In the Library of Royal Irish Academy.

[26]*Accounts and papers* (15), 1864, 46. (In the National Library, Dublin).

[27]In the Science Library of University College, Dublin.

[28]The Townland Valuation for Connaught, Leinster (County Dublin excepted) and Ulster was published between 1836 and 1848. The printed volumes are scarce, but can be seen in the Valuation Office and in the National Library. Somewhat surprisingly, the

Barony of Galway in the County of Galway is omitted from the printed Townland Valuation, but a reference to the original field books in the Valuation Office shows that the figures there given were used by Kane, since they fit in with the colour scheme in the Table.

[29](Sir) Henry James, 1808-1877, entered the Royal Engineers in 1826 and was appointed to the Ordnance Survey. He was made Director of the Geological Survey in Ireland in 1845 and, on his resignation in 1846, became Superintendent of Construction at Portsmouth. He was Director-General of the Ordnance Survey from 1854 to 1875.

[30]See letter books of the Geological Survey for correspondence regarding soil samples and for the annual reports of the Director.

[31](Sir) Henry De la Beche (1796-1855), was appointed in 1832 by the British Government to conduct the Geological Survey, and ultimately became Director-General.

[32]Thomas Oldham, F.R.S., (1816-1878), was appointed Professor of Geology, Trinity College, in 1845. He was Director of the Irish Geological Survey from 1846 to 1850, when he resigned to become Superintendent of the Indian Survey, a post which he held until 1876. Like James, he expressed, when resigning, his dissatisfaction with the arrangements for the Irish Survey; control by letter from London did not function smoothly.

[33]Joseph Beete Jukes, F.R.S., (1811-1869), was Director of the Irish Geological Survey from 1850 to 1869 and Professor of Geology in the Museum of Irish Industry and in the Royal College of Science for Ireland.

SALMON AND TROUT

Natural and Artificial Propagation as Factors in the Maintenance of Stocks

By

ARTHUR E. J. WENT, Inspector of Fisheries.

The object of fishery regulations whether statutory or departmental is, in the ultimate, *conservation*. That is to say, it is sought by the imposition of certain restrictions to ensure such a run of fish for breeding purposes as will increase or at least maintain the stocks. Many citizens profess dissatisfaction with the existing stocks of fish in our rivers and lakes and persistently urge that they should be enhanced by all practical means. Generally the method which suggests itself to such persons is the setting up of a hatchery, to be operated either by stripping fish captured locally or by procuring supplies of ova (eggs) from outside sources. There seems to be a rather widespread belief that such a procedure even on a modest scale is bound to produce immediately beneficial results for the waters concerned. In other words, the operation of a hatchery is expected to offset completely the evils of over-fishing, as well as the damage resulting from illegal activities (whether within or outside the fishing season) and the reduction in stocks caused by predatory birds, fish and mammals added to the pollution of waters by the entrance of deleterious matter. Such a belief is, however, fallacious as it cannot be accepted in any degree without serious reservation. This idea as to the over-riding effect and efficiency of artificial propagation not improbably has its basis in the attitude adopted by some early writers on the subject who tended to stress the contention that in nature the process of fertilisation was very inefficient. Over a long period few were found to question the accuracy of such a viewpoint. More recently, however, a number of critics have challenged the validity of this theory, and one observer (Hobbs)* in New Zealand published the results of his investigations into the question and showed that natural spawning, at least in the circumstances prevailing in that country, was a remarkably efficient process. Many other well-known fishery scientists hold like opinions on natural spawning. Taking, however, the bulk of the investigations bearing on the subject, the indication seems to be that relatively heavy losses occur in nature from the alevin stage onwards. Generally, on the information available it seems possible that in natural spawning the process of fertilisation may approach in efficiency that which obtains in artificial propagation. It is, of course, to be borne in mind that if the produce of a hatchery be distributed as fry the losses sustained by the hatchery-bred fish are not likely to be less than those sustained by fish resulting from natural spawning. Where ova are

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* Derisley F. Hobbs, 1937. "Natural reproduction of quinnat salmon, brown and rainbow trout." *Fisheries Bulletin No. 6, New Zealand Marine Department.*

stripped from parent fish obtained locally the *net gain to the fishery is* represented by the difference in efficiency between artificial propagation and natural spawning under conditions obtaining in the particular fishery. Even assuming a hatchery to be well run and provided with a satisfactory water supply, and that the fry are turned out with due precautions into a suitable area of river and lake, this net gain will be little or great according to the conditions prevailing in the particular fishery.

The introduction of eggs into the hatchery from sources outside the particular fishery with which we are here concerned can obviously be done only at the expense of some other fishery.

The statement that a hatchery will not necessarily remedy obvious defects in a system under which a particular species (either salmon or trout) has lived may now be examined in greater detail. If the problem is to be treated rationally a careful study of the water proposed to be re-stocked must be made with the object of determining whether there are evident reasons for the depletion of its stock, such as pollution, lack of spawning facilities, obstacles to migration, increasing numbers of predatory fish, birds, or mammals, over-fishing, or inadequate protection. If any of these be present it is essential to counter it before embarking on hatchery operations. Any one of such causes may well be responsible for a considerable loss of stock; and one concrete example will illustrate how necessary is the removal of inpediments to the *natural* development of fish before attempting artificial propagation. Periodical reports reach the Fishery Authority that considerable numbers of salmon and trout are being taken by illegal methods in certain areas. For instance, it has been firmly alleged that in the main spawning stream for one of our small lakes up to 500 trout are being removed by local delinquents in each spawning season. Assuming that these trout would normally average about 1 lb. and further assuming one half of the total to be females, then the loss of eggs alone would amount to anything from 150,000 to 225,000 (each lb. of body weight of a female trout yields 600-900 eggs, depending on a number of factors which man cannot influence).† Despite such a heavy loss of trout eggs from the cause stated, the Anglers' Association in the district seriously believes that the operation of a hatchery capable of holding, say, 20,000 eggs, would go far towards counteracting the nefarious activities of the poachers. A hatchery capable of holding 200,000 eggs would be a large one costing upwards of £200 to construct and entailing annual expenditure of £100 at least to operate. Would it not be much better and cheaper for all concerned if, by enlightening public opinion, sympathy with the poacher's outlook were no longer to be tolerated, and our people led to understand the vital importance of permitting fish to reach their spawning beds in good numbers for natural reproduction?

Here is another thought bearing on the problem. Assuming that the stocks

†With salmon the number of eggs per lb. of body weight is somewhat less, 400-600, on account of the larger size of the egg.

of fish in a given locality comprise equal numbers of males and females, then for such stocks to remain constant each female must produce during her lifetime at least two offspring which reach maturity. It has been estimated for some fisheries in this country that each female produces four such offspring, and of course the surplus can safely be removed without reduction of the stock in such a case. Conversely if too many fish are removed it is obvious that the balance of nature will be upset and that the stock will diminish.

To sum up, how are we likely to help best in developing to the maximum our valuable fisheries? The answer is, that public opinion must be roused against those indulging or attempting to indulge in illegal practices (especially during the close season) which, if permitted to expand, must inevitably result in the reduction of our fish stocks to a point where replenishment will be extremely difficult, if not impossible. It is true, that poaching can be combatted in fair degree by the efforts of competent water keepers, but something more is required. Our citizens must develop a full appreciation of their duties and responsibilities in respect of a great national asset; and, while themselves refraining from contraventions of the fishery regulations, they must firmly oppose all attempted infractions of them by persons less conscientious.

In some respects man's intervention can produce beneficial results. The destruction or rigid control of fish-eating birds and mammals, the reduction in numbers of coarse fish, the improvement of facilities for the migration of sporting fish, the opening up of streams in which such fish can spawn free from interference or the risk of drought —all these afford a field of positive development suitable for members of angling associations and others genuinely interested. It is not feasible to set out, within the limits of a short article, details of the *modus operandi* for such activities; but technical advice will be supplied in respect of any specified programme or proposal so far as commitments on the time of the Department's technical staff may permit.

At all events, it may be taken as certain that time and money intelligently expended in the manner indicated above will yield on the whole better results than those likely to accrue from similar expenditure upon the outfitting and maintenance of a hatchery of the type generally visualised by enthusiasts. It is not, of course, suggested that hatcheries for the propagation of salmon and trout are useless. On the contrary, given suitable conditions and granted really expert management valuable results can be achieved by artificial propagation. What it is desired to stress is that far-reaching results of a really beneficial character cannot be expected from the operation of a fish hatchery unless and until all the factors tending to affect adversely, and in serious degree, the stock of the particular river or lake under consideration have been eradicated or, at least, minimised.

LOUGHGLYNN RURAL DOMESTIC ECONOMY SCHOOL

In picturesque surroundings, over-looking a beautiful lake and sheltered by ancient woods about mid-way between Castlerea and Ballaghaderreen in County Roscommon, stands the Convent of Our Lady of the Angels—the first foundation house of the Franciscan Missionaries of Mary in Ireland. The building, which is now the Convent, was formerly the seat of the Dillon family, who owned an estate of over 90,000 acres in Roscommon and Mayo, and whose tenantry numbered over 4,200.

THE OLD ORDER CHANGETH.

In May, 1899, the Dillon estate passed into the hands of the Congested Districts Board and most of the land was divided up amongst the existing tenants. The demesne and fine old mansion, however, remained in the possession of the Board until some years later.

His Lordship, the Most Reverend Dr. Clancy, Bishop of Elphin, had been forcibly impressed during a visit to Belgium in the early years of the century by the excellent work of the Franciscan Missionaries of Mary in the training of girls for life on the land, and he therefore, decided to enlist their help with a view to improving the lot of the small-holders in his own diocese. Accordingly he purchased Loughglynn House and portion of the demesne and in October, 1908, a community of fifteen sisters took up residence in their new home.

The newly established Department of Agriculture and Technical Instruction had been already considering the feasibility of establishing Rural Domestic Economy schools. When, therefore, the Most Rev. Dr. Clancy put forward proposals for such a school at Loughglynn he found the Department quite willing to provide financial assistance. The Department agreed to remodel and equip the building and farm for the teaching of dairying, poultry-keeping, household management, cookery, sewing, knitting, laundry-work, gardening, cottage industries and sick nursing. It was further arranged that in return for the efficient teaching of these subjects the Department would contribute an annual grant to the community.

The following paragraph, which occurs in the first prospectus issued on behalf of the school indicates the aims of its founders: "This school has been established in order to provide the women and girls of the neighbourhood with such practical training as will enable them to increase the comfort of their homes and improve generally the conditions under which they live. The particular object of the Department in promoting this type of instruction in rural districts in Ireland is to inculcate respect and affection for the home and countryside and thereby counteract the tendency to despise farm-work and

Convent and Rural School, Loughglynn, Co. Roscommon

abandon rural life. It does not aim at the preparation of girls for domestic service or for the factory or the shop."

In March, 1904, the first pupils entered the school. During that year an officer of the Department resided at Loughglynn for the purpose of adapting and equipping the school and farm for teaching the Department's programme. In March, 1905, the Convent assumed full responsibility for the running of the school and farm.

HOW THE SCHOOL FUNCTIONS.

Girls over fourteen years of any religious denomination are eligible for admission to the school and they may continue in attendance as pupils for three years. The school is open from Mondays to Fridays inclusive each week and from 10 a.m. until 3 p.m. each day. The girls, all of whom reside at their own homes, cycle or walk to the school daily. No fee is charged. The instruction includes a daily lecture in one of the subjects on the programme, but is otherwise mainly of a practical nature under the constant supervision of the teachers. A mid-day meal is provided for the pupils free of charge. Pupils are paid on a piece-work basis for articles made in the sewing or knitting classes. Many girls who have completed their courses find congenial employment in the work-rooms of the school.

The numbers enrolled annually since the establishment of the school average 36. Circumstances arising out of the recent emergency have militated against attendances and only 22 girls were enrolled for the 1945-46 session. Since most of the girls normally cycle to the school daily, the shortage of bicycle tyres in recent years has been one of the principal factors which have adversely affected enrolments. It is worth noting that towards the end of the 1914-18 War there was a similar falling-off in attendances. Indeed the number enrolled in the last year of that war was only 21. By 1920, however, there was a marked improvement in attendances. The school authorities are confident that history will repeat itself and that, when normal conditions return, girls will again flock to the school in increased numbers.

THE PLOUGH PLAYS ITS PART.

Although the total area attached to the school is 280 acres, much of the acreage is under woods and water and only about 40 acres are suitable for agricultural purposes. Ten cows, their calves, a couple of brood sows and a number of fattening pigs usually figure amongst the livestock. Even in pre-emergency days about half the arable land on the holding was generally under tillage, the aim being to make the community and the livestock as independent as possible of purchased feeding stuffs. During the recent emergency, an extension of the tillage policy has been fruitful of many advantages in the running of the farm and school.

MODERN METHODS WITH MILK.

St. Brigid's dairy at Loughglynn is well-designed and efficiently equipped for the handling of about 200 gallons of milk daily. Since only ten cows are kept on the farm the purchase of milk from farmers in the surrounding district is necessary. In pre-war days when feeding for livestock was plentiful and when markets for farmers' butter were uncertain and often unsatisfactory, ample milk supplies were usually procurable. In recent times, however, only limited supplies of milk have been obtainable. Purchased milk is tested for butter-fat on arrival at the dairy. About half the milk is converted into finely flavoured butter and the remainder is used for the manufacture of cheeses of a quality which would satisfy the most exacting gourmet. Cheshire cheese is perhaps made in greatest quantity, but cheeses such as Camembert, Port Salut, Pont l'Eveque, Gervais. Gouda and the characteristically coloured Edam are all produced there. The choice dairy products of Loughglynn have acquired an enviable reputation and their sale never presents any difficulty. The dairy here not only provides an opportunity for giving the pupils a thorough knowledge of butter-making and cheese-making but it also provides a more remunerative market for their parents' dairy produce than would otherwise be available.

UP-TO-DATE POULTRY-KEEPING.

The average Poor Law Valuation per head of the population in Loughglynn District Electoral Division according to the 1936 Census was only £2 8s. 0d. The importance of poultry in a district of small farms can scarcely be exaggerated. On the school farm pure-breeds of poultry are kept under semi-intensive conditions. Pupils get plenty of experience in the feeding and general management of poultry, the handling of incubators and hovers, the preparation of poultry and eggs for the market and the innumerable matters which require attention from the woman who wishes to make poultry-keeping profitable. The sale of hatching eggs from the pure-bred blood-tested stock kept at the school, to local farmers, has done a great deal to improve the poultry stock of the surrounding district.

ARTS AND CRAFTS OF THE HOME.

It should be every girl's ambition to become a good housekeeper. In the well-kept kitchen at Loughglynn, the girls learn both the principles and practice of good and economical cooking. In a well-equipped laundry, they get practical instruction in the washing and ironing of a wide variety of articles. The work-rooms are fitted with everything necessary for the teaching of sewing, knitting and carpet-weaving. An extensive range of serviceable articles is produced by the pupils and any such articles not required for their own households are marketed by the Convent, the pupils being remunerated for their labour out of the proceeds.

The shortage of materials has restricted the work in this department in recent years. In normal times, when materials were freely available, the earnings of the pupils and ex-pupils in the work-rooms provided a welcome addition to the slender incomes of the small-holders and cottagers of the district.

The finer kinds of needle-craft are a special feature of the work done at the school. Beautiful church vestments and artistically embroidered cloths are turned out by the more advanced pupils. Indeed an examination of the work of the more experienced girls in this beautiful accomplishment brings to mind Cowper's lines : —

"And here the needle plies its busy task,
The pattern grows, the well-depicted flower
Wrought patiently into the snowy lawn
Unfolds its bosom, buds and leaves and springs
And curling tendiils gracefully dispersed
Follow the nimble fingers of the fair."

NEIGHBOURLY VISITS AND ADVICE.

This further quotation from a prospectus issued by the school in its early days may not be out of place: "House-wives and others in the neighbourhood who are not in a position to attend the classes daily, are at liberty to avail themselves of the instruction in any subject, and to come to the school when they desire it in connection with their home-work and the teachers are prepared to visit homes of persons who desire their guidance in the difficulties of home management." Down through the years the facilities here indicated have been freely extended to the residents of the district. Without a shadow of doubt, the neighbourly visits of the Sisters have contributed much towards the making of happy homes in the locality.

MANY-SIDED ACTIVITIES.

A few examples may be cited to show how the influence of the school has occasionally radiated far outside the boundary walls of the old demesne. As early as August, 1905, when the Sisters staged an exhibit of the work done in the school at the Arts and Industrial Exhibition promoted by the Oireachtas of the Gaelic League, their stall attracted considerable attention, and drew particularly complimentary comments from the contemporary press.

The eleventh Annual Report of the Department of Agriculture and Technical Instruction contains the following tribute to the work of the community: "The Manager afforded valuable assistance towards the promotion of the practice of spraying the potato crop by undertaking arrangements for the lending of spraying machines to small-holders in the neighbourhood of the school, which is situated in a congested area. Twenty-four machines were supplied by the Department for this purpose. During the year 1910-11, ninety-seven persons availed themselves of these arrangements."

At the invitation of the Department of Agriculture, two sisters from the Convent staged an exhibit of cheeses made in the school dairy and gave demonstrations daily on cheese-making at the Royal Dublin Society's Spring Show held at Ballsbridge in May, 1946. Large numbers of people watched the demonstrations every day with very apparent interest. The press again, as in 1905, paid high tribute to the excellence of the exhibit and the efficiency of the demonstrators.

FACING THE FUTURE WITH CONFIDENCE.

At the beginning of the century the lot of the rural population of Loughglynn district was far from happy. Since then, however, a wonderful improvement has been effected in the social and economic condition of the people. The transfer of ownership of the land from the landlord to the farmers was, of course, the first important step in the process of amelioration. Amongst the other factors that have played their part in raising the standard of comfort of the people, the work done at the Rural Domestic Economy School ranks high.

The hand and eye training, the habits of cleanliness, neatness and industry, the love of the artistic and beautiful, the affection for home and country acquired at the school have all contributed towards the making of happy homes. The numerous model housekeepers to be met with throughout the district provide convincing evidence of the success of the school. Unfortunately all the past pupils have not given the benefit of their training to the land of their birth. It is some satisfaction, however, to learn that many ex-pupils, who emigrated, have later in life returned to marry local farmers.

There is no gainsaying that the Franciscan Missionaries of Mary have unobtrusively rendered sterling service to the people of West Roscommon. They have fostered home industries and have, thereby, helped small-holders to augment their incomes from the land. They are confident that in the future their work in this direction can be further extended. They have been pioneers of modern methods of poultry-keeping and dairying in the district. They realise the importance of keeping step with the march of time in the training of future generations of farmers' wives and they aim at keeping their school as it has been for over forty years—a centre of enlightenment for the surrounding countryside.

NOTES ON FLAX DISEASES IN 1946

By

PROFESSOR R. MCKAY, D.Sc., and J. B. LOUGHNANE, M.Sc.,
Department of Plant Pathology, University College, Dublin.

Observations on flax diseases were continued in 1946, some 26,000 acres of fibre flax being under close supervision of Inspectors employed by the Department of Agriculture and the Flax Development Board, Ltd.. Dublin. As in the previous year, practically all the seed sown was obtained through the British Ministry of Supply.

Samples of diseased and suspected plants were forwarded by the Flax Inspectors for examination, the majority of these specimens coming to hand in the months of May and June. The various diseases identified on these samples are tabulated in Tables I and II, the former being in the nature of a summary while the latter contains particulars of varieties of flax affected.

TABLE I.

Showing Diseases Identified on Flax Plants forwarded by Flax Inspectors during the period 1st April to 1st September, 1946.

Diseases	*Samples Affected*
FUNGUS DISEASES:	
Seedling Blight, *Collectotrichum linicola*	2
Damping Off, *Rhizoctonia* spp.	21
Grey Mould, *Botrytis cinerea*	12
Stem-Break and Browning, *Polyspora Lini*	7
Rust and Firing, *Melampsora Lini*	13
Phoma spp.	9
Alternaria spp.	4
Wilt, *Fusarium Lini*	2
Stalk Disease, *Sclerotinia sclerotiorum*	1
INSECT DAMAGE:	
Flax Flea Beetle, *Longitarsus parvulus*	17
Capsid Injury, *Calocoris* spp.	5
Leather Jacket Grubs, *Tipula* spp.	1
NON-PARASITIC DISEASES:	
Droop	1
Scorch due to application of artificial manures	1
Soil and environmental conditions	9
	105

Table II.

	Variety of Flax Affected					
	Liral Crown	Liral Prince	Liral Monarch	Stormont Gossamer	Not Named	Total
Fungus Diseases:						
Seedling Blight	—	—	—	—	2	2
Rhizoctonia	1	4		11	5	21
Grey Mould	6	4	—	2	—	12
Stem Break and Browning	3	1	—	3	—	7
Rust and Firing	4	5	—	2	2	13
Phoma spp.	3	5		1	—	9
Alternaria spp.	1	2	—	1	—	4
Fusarium Wilt	1	1			—	2
Sclerotinia (Stalk Disease)	—	1	—	—	—	1
Insect Pests:						
Flax Flea Beetle	1	1	1	7	7	17
Capsids		3	—	—	2	5
Leather Jacket Grubs ..	—	—	1	—	—	1
Non-Parasitic Troubles:						
Droop	—	—	—	1	—	1
Scorched by artificial manure	1	—	—	—	—	1
Soil and environmental conditions	2	5	—	—	2	9
Totals ..	23	32	2	28	20	105

Weather conditions. The months of March, April and May were relatively dry, with the rainfall below normal. June was wet but the rainfall was not excessive. The first fortnight of July was warm and it included the only summer weather experienced in 1946. The remainder of July was showery and the month of August was exceptionally wet, not only with regard to total rainfall but also to the number of days on which precipitation occurred. The climatic conditions were similar throughout most of the flax-growing areas in the twenty-six counties.

Inspection of flax fields in Co. Cork during the period 3rd-6th July showed that all crops were then vigorous and standing well. Some crops, at this time, were being pulled.

Phoma spp. Attacks of this fungus were slight, the disease being mainly indicated by the presence of occasional dead or dying stalks which were diseased at their base, or in a few cases where little patches of diseased plants occurred. The worst attack of *Phoma* seen was in a field, in which the disease occurred in certain spots, involving 5 per cent. of the plants on these particular areas.

Rust, *Melampsora Lini.* This disease was present in almost every field but in general the attack had been late in developing, the parasite being chiefly

in the uredospore stage on the foliage, and "firing" on the stalks was negligible. The onset of Rust in Co. Cork in 1946 occurred much later than that in the previous year.

The Grey Mould, *Botrytis cinerea*. Occasional plants were found which had their tops killed by *Botrytis*, but no serious case of this disease was noticed.

Inspection of the northern flax districts during 10th-18th July showed an entirely different picture from that occurring in Co. Cork. In counties Cavan and Monaghan much of the flax had been sown late, and in many places the Flax Flea Beetle *Longitarsus parvulus* had devastated the crop. Attacks of this pest were exceptionally severe in 1946 and the dry weather during May favoured its ravages. In some instances scarcely a plant was left in the ground over considerable areas of the fields, while elsewhere, in the same fields, premature branching was common owing to the destruction of the growing point of the young plants.

The drought which occurred during April and May, however, had another very serious effect. This was the condition known to growers as "second growth" (which in reality is a question of delayed germination owing to insufficient moisture in the soil). At the July inspection many fields had plants of varying heights; about one-third of the crop being 30-36 inches long, other plants 18-24 inches and the remainder 6-9 inches. This irregularity in height was the result of sowing the seed under dry conditions and it was very prevalent in the case of leys which had been ploughed late. It was calculated that from one-third to one-half at least of all the flax crops seen in the northern area had either suffered severely from the Flax Flea Beetle or were practically failures as the result of so-called "second growth." Some injury by Capsids was noted, but in the few cases seen the damage done was adjacent to hedges and it did not amount to very much.

Stem Break, *Polyspora Lini*. This disease occurred in almost every field, irrespective of variety. In the majority of cases the percentage of diseased plants was low, but one field of Gossamer was badly affected.

Phoma spp. Although traces of *Phoma* occurred here and there throughout the fields this disease did not appear to be of much consequence. The scarcity of Foot Rot in 1946 might be co-related with the absence of the variety Liral Monarch, and in this connexion it is rather interesting to record that the only case of Foot Rot observed occurred in definite patches and was stated to be in this variety, although no Liral Monarch was supposed to have been sold in the district.

Rust, *Melampsora Lini.* In the northern areas Rust, with a couple of exceptions, was just making its initial appearance in flax fields during the second week of July, traces of the disease only being apparent on the upper foliage. Specimens from some of these crops were received afterwards from the Inspectors when the flax was being pulled; some "firing" had developed in the meantime, but the general indications are that when Rust only appears about the time of flower drop or later, the disease does not develop seriously seriously on the stems.

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SLUG DAMAGE TO POTATO TUBERS

By

J. CARROLL, D.Sc., D.I.C., B.Agr.Sc., and D. DEASY, Ph.D., B.Agr.Sc.

The damage which slugs can cause to potato tubers is well known. particularly to those who grow potatoes in gardens and allotments. Sometimes, also, considerable damage is caused to potatoes grown on a field scale. During the recent war years when greatly increased quantities of potatoes were planted in gardens and allotments the problem of slug damage was correspondingly increased and the number of complaints and enquiries concerning it were very numerous. Slug damage to potato tubers is often mistakenly attributed by growers to wire worms or other insect pests.

In areas where slugs are plentiful it is common to find that when potatoes are lifted they are extensively damaged and to a great degree worthless. Moreover, potatoes that are fairly sound or apparently sound at digging time may contain slugs which have recently entered them. If such potatoes are stored the slugs within them will continue to feed and as time progresses the interior of the tubers is eaten away until finally little more than skin may be left. In addition to the actual damage caused by slugs it is well known that potatoes invaded by them are more liable to be subsequently attacked by fungoid and bacterial diseases and by such pests as millepedes, springtails, etc.

The desirability therefore, of preventing slug damage to potato tubers, or at least of reducing it to a minimum is apparent.

It may be observed that main crop potatoes allowed to remain in the ground until late in the season are more liable to be badly damaged by slugs than early and second early varieties which are lifted earlier. The obvious explanation of this is that the slugs feed mainly above ground during the spring and summer and do not seek underground food until the season is well advanced.

It has been suggested by some potato growers that certain varieties of potatoes are less liable to heavy attack by slugs than others, but little precise information in regard to this fact was available.

In order to test varietal susceptibility to slug attack and also to ascertain the extent of attack at various digging times a detailed experiment was carried out during the 1946 season. Thirteen commonly grown varieties of potatoes were chosen for the experiment, viz. *white (or faintly yellow) skinned varieties:* Epicure, Spry's Abundance, British Queen, Up-to-Date, Dunbar

Rover, Arran Banner; *yellow skinned varieties:* Great Scot, Champion; *brownish skinned variety:* Golden Wonder; *pink skinned variety:* Kerr's Pink; *pink splashed varieties:* King Edward, Gladstone; *purplish skinned variety:* Arran Victory.

A kitchen garden plot known to be a bad slug area was chosen as a site for the experiment. The plot was sufficiently long to lay out thirty-nine drills, each length of drill being divided into halves so that seventy-eight sub-plots were available, thus providing five replications for each of the thirteen varieties. The varieties were planted in random fashion over the plot, ten tubers of each variety being planted in each half drill so that sixty tubers of each variety were planted altogether. This number allowed a margin for occasional misses. Planting was done in April and subsequent cultivation, moulding up and spraying were done in routine fashion.

During the third week of August, the first week of September, the third week of September and the first week of October two plants were dug from each half drill that is, twelve plants of each variety. The total number of tubers under each plant was counted and also the number damaged by slug attack. Each tuber was carefully scrutinised to ascertain whether any slugs had entered it and every tuber which showed even the smallest hole was cut to ascertain the extent of the damage. Although records were kept of the number of tubers showing slight damage and also the number more severely damaged, it was considered sufficient to show the total number damaged in the following tables. It may be taken for granted, however, that the great majority of tubers showing only slight damage at digging time would have become badly damaged after the lapse of some further time if they had been allowed to remain longer in the ground or put into storage.

FIRST DIGGING—3rd Week of August.

VARIETY	No. of Plants	Total No. of tubers	No. of tubers damaged by slugs	Percentage damaged (nearest whole No.)
Epicure	12	115	17	.15
Spry's Abundance	12	124	8	6
British Queen	12	163	8	5
Up-to-Date	12	186	7	5
Dunbar Rover	12	126	8	6
Arran Banner	12	106	2	2
Great Scot	12	127	10	8
Champion	12	146	16	11
Golden Wonder	12	138	18	13
Kerr's Pink	12	148	28	19
King Edward	12	155	24	16
Gladstone	12	118	19	16
Arran Victory	12	161	14	9

SECOND DIGGING—1st Week of September.

Variety	No. of Plants	Total No. of tubers	No. of tubers damaged by Slugs	Percentage damaged
Epicure	12	122	32	26
Spry's Abundance	12	151	29	19
British Queen	12	159	10	6
Up-to-Date	12	126	13	10
Dunbar Rover .. .	12	164	19	12
Arran Banner	12	104	19	18
Great Scot	12	142	41	29
Champion	12	161	38	24
Golden Wonder	12	157	45	29
Kerr's Pink	12	166	55	33
King Edward	12	153	57	37
Gladstone	12	133	77	58
Arran Victory	12	167	37	22

THIRD DIGGING—3rd Week of September.

Variety	No. of Plants	Total No. of tubers	No. of tubers damaged by Slugs	Percentage damaged
Epicure	12	114	29	25
Spry's Abundance	12	159	39	25
British Queen	12	92	24	26
Up-to-Date	12	148	60	40
Dunbar Rover	12	94	21	22
Arran Banner	12	92	24	26
Great Scot	12	187	64	34
Champion	12	158	66	42
Golden Wonder	12	164	73	45
Kerr's Pink	12	133	81	61
King Edward	12	171	78	46
Gladstone	12	144	64	44
Arran Victory	12	117	45	39

FOURTH DIGGING—1st Week of October.

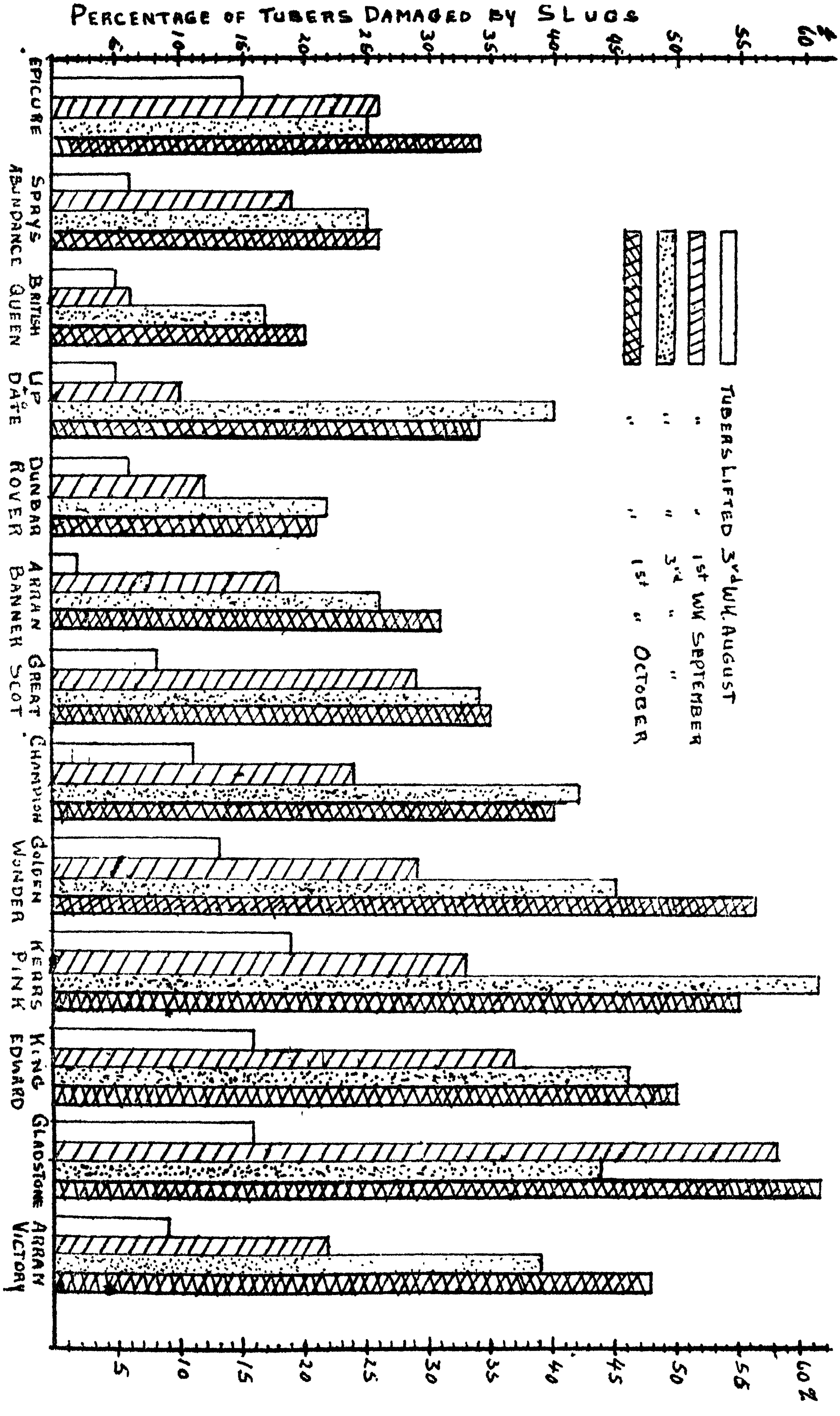
VARIETY	No. of Plants	Total No. of tubers	No. of tubers damaged by Slugs	Percentage damaged
Epicure	12	115	39	34
Spry's Abundance	12	169	44	26
British Queen	12	125	25	20
Up-to-Date	12	113	38	34
Dunbar Rover	12	95	20	21
Arran Banner	12	89	28	31
Great Scot	12	120	41	35
Champion	12	140	56	40
Golden Wonder	12	135	75	56
Kerr's Pink	12	156	86	55
King Edward	12	193	97	50
Gladstone	12	137	84	61
Arran Victory	12	127	60	47

The above results can be readily and clearly seen from the graphical representation of the percentage of tubers damaged at each digging time.

As was anticipated, the percentage number of tubers damaged at time of first digging was, for every variety, much smaller than at time of any subsequent digging, varying from 2% in the case of Arran Banner to 19% in the case of Kerr's Pink. Generally speaking, however, with few exceptions, there was a progressive rise in the number of tubers damaged at times of second, third and fourth diggings, the highest figures recorded being 61% for Kerr's Pink at third digging and for Gladstone at fourth digging.

From these results it would appear that some varieties of potatoes are more susceptible to slug attack than other varieties. Generally speaking, white skinned varieties were least damaged and pink or pink splashed varieties were most damaged. Golden Wonder (brownish skin) and Arran Victory (purplish skin) were also rather badly attacked. Previous casual observations that pink and pink splashed varieties and also Golden Wonder were very susceptible to slug attack were borne out by the experiment.

It may be quite a coincidence that the skin colour is correlated to the intensity of slug attack. Other factors may, however, be responsible for the degree of susceptibility, but no data concerning the significance of these was obtained from the experiment. It is clear that if potatoes are lifted before, say, the middle of August (by which time even second early varieties should be mature) little damage by slug attack would be caused. The longer potatoes are left in the ground after the middle of August the more extensive will be the damage resulting from slug attack. On areas where there is a big population of slugs, late maturing varieties (which normally would not be dug until


PERCENTAGE OF TUBERS DAMAGED BY SLUGS
EPICURE
SPRAYS ABUNDANCE
BRITISH QUEEN
UP TO DATE
DUNBAR ROVER
ARRAN BANNER
GREAT SCOT
CHAMPION
GOLDEN WONDER
KERRS PINK
KING EDWARD
GLADSTONE
ARRAN VICTORY
TUBERS LIFTED 3rd WK. AUGUST
" " 1st WK SEPTEMBER
" " 3rd " "
" " 1st " OCTOBER

October) should be avoided, particularly those varieties shown by the above experiment to be highly susceptible to slug attack.

While much may be done to minimise slug damage to potato tubers by avoiding susceptible varieties and by digging the crop as early as possible, it should be remembered that slugs can be killed in great numbers while they are above ground by use of a metaldehyde bait. It would be a very commendable practice to scatter such a bait over the potato area after each moulding up of the crop. This practice would undoubtedly kill a great proportion of the slugs which inhabit the area and, accordingly, would reduce considerably the number liable to enter the ground and attack the potato tubers later in the season.

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A STUDY OF ICE CREAM SOLD IN CORK CITY

By

B. J. O'Neill, M.Sc. (Dairying) and M. Grimes, M.Sc., Ph.D., Dairy Bacteriology Department, University College, Cork.

Ice-cream which was a delicacy until recent years has now become a standard food. This change has been brought about by the increasing demand for it particularly for children and invalids not only seasonally but all the year round. Because of its composition ice-cream may easily become a carrier of pathogenic bacteria and, in fact, in certain cases it has been found to cause outbreaks of typhoid fever, septic sore throat, gastro-enteritis and various forms of food poisoning. These considerations lend particular importance to the work of ascertaining the standards obtaining in the making, storing and sale of this product.

The study reported below extended over the months of April, May and June, 1946, and was undertaken primarily to ascertain the quality, microbiologically and chemically, of ice-cream sold in Cork City for human consumption, that is, the quality of the ice-cream when it reaches the consumer. To this end, 1d. or 2d. wafers were purchased over the counter in the ordinary way in various retail establishments. It was sought to secure four or five samples of the products of each of the principal manufacturers in the City, and, in fact, the ice-cream purchased was made in many types of premises from the large-scale factory to the small shop which uses what is termed in the trade " a cold mix ice-cream powder."

MICROBIOLOGICAL EXAMINATION.

Preparation of Sample.

Each wafer was placed in a sterile container and examined as soon as possible after arrival at the laboratory. About 18 or 20 grams from the centre of the wafer were placed in a sterile, tared, bottle 2 ozs. in capacity. When the exact weight of the ice-cream was recorded there was added a quantity of sterile water sufficient to produce a calculation factor of from 2.5 to 3 and a total volume of approximately 38 millilitres. The volumetric method as used for new milk was followed. The ice-cream was placed to melt in water of a temperature of 100° to 110°F. and left there for two or three minutes. It was then well shaken to give even distribution of both the flora and the constituents. A boiling water-bath or flame was not suitable for this purpose as melted butter-fat tends to separate and rise to the top.

STANDARD PLATE COUNT.

This reveals the number of organisms in a sample capable of growth under rigidly prescribed conditions which are favourable to a certain percentage of its total bacterial flora. It is assumed that the same percentage of the bacterial flora of all samples would grow if they were plated under these strictly standard conditions. The medium used was tryptone-dextrose-beef-extract-agar prepared according to standard methods, *i.e.* those described in the publication " Standard Methods for the Examination of Dairy Products " issued by the American Public Health Association.

Samples were plated in duplicate using $\frac{1}{1000}$ and $\frac{1}{10000}$ dilutions. For those with a history of high counts a $\frac{1}{100000}$ dilution was included. Plates were incubated at 21°C. for from 3 to 5 days and at 37°C. for 2 days. Counts between 40 and 200 were taken as being actual counts, results in all cases being multiplied by the relevant calculation factor.

Because of the low temperature at which it is maintained the possibility of the development of organisms in ice-cream after its manufacture may be ruled out. This means that the conditions under which ice-cream is made are reflected in its bacterial count at the time of sale. If there is carelessness at any point in the process of manufacture, or if ingredients of poor quality are used, the finished product is almost certain to have a high bacterial count. Where such results are obtained it may prove necessary to take samples of the material at each stage of the process before the cause of the trouble is located.

The wholesomeness of the ice-cream cannot, however, be judged solely from the number of bacteria it contains. A high bacterial count does not necessarily mean that the plant is insanitary or that the product is unwholesome but rather that there is something faulty about the methods or ingredients used. On the other hand a low bacterial count is not necessarily a recommendation since improper methods may be masked by pasteurisation with after-contamination as a result.

For yeast and mould counts, agar prepared according to the methods already referred to and acidified to pH3.5 by means of lactic acid, was used. Dilutions of $\frac{1}{10}$ and $\frac{1}{100}$ were plated for each sample and plates were incubated at 21°C. for 5 days.

COLIFORM TEST.

Lactose broth and inverted Durham tubes were used, dilutions of $\frac{1}{10}$ and $\frac{1}{100}$ being incubated at 21°C. for 3 days and at 37°C. for 2 days.

The Escherichia, Aerobacter group consists of gram-negative, non-spore-forming rods fermenting lactose with the formation of gas which is trapped in

the Durham tube. The first essential of an organism belonging to this group is gas production when inoculated into lactose broth. All positives are then streaked on Levine medium. Positive *Escherichia* species are indicated by a metallic sheen. *Aerobacter* species do not react thus to this medium. The presence of *Escherichia coli.* points to faecal contamination of either human or animal origin and to unsatisfactory conditions in the process of manufacture. Such contamination was found once in 96 samples. *Aerobacter species* are soil organisms and their presence also points to unsatisfactory conditions of manufacture. They were found in 28% of the samples.

Anaerobic Spore-former Test. (*Clostridium group*). Sterile tubes, containing about 8 mls. of the sample and sealed with a layer of vaseline, were heated to 176°F. for 10 minutes. This was done to destroy vegetative cells, to drive out any oxygen which might have been contained and to provide an anaerobic seal. The tubes were then incubated at 37°C. for 24 hours. In this test positive reaction is indicated by a gassy fermentation which displaces the vaseline plug. In interpreting its results two assumptions were made :

(1) that manure and dirt are the chief sources of anaerobic spore-forming bacteria in dairy products ; and
(2) that the conditions under which dairy products are ordinarily handled are not conducive to the growth of these organisms for which reason the number found in the sample is approximately that transmitted in contacts in these sources.

While this test reveals the presence of these bacteria it does not indicate whether they are due to the conditions of manufacture or to the ingredients used.

CHEMICAL ANALYSIS.

ACIDITY TEST.

When the bacteriological examination of a sample was complete 10 mls. of it thus diluted were placed in an evaporating basin and .5 ml. of 1.5% alcoholic phenolphthalein solution added. This was titrated against standard N/9 NaOH so that at the point of neutrality it was a faint pink for 30 seconds. The number of millilitres of alkali was noted and the percentage of citric acid was calculated according to the following formula :—

Titration figure (converted to mls. N/10) $\times$ 10 $\times$ calculation factor $\times$ .0064 = percentage citric acid.
1 ml. N/10 NaOH = .0064 grams of pure citric acid.

BUTTER-FAT.

Because of the sugar it contains and its otherwise rather complex nature ice-cream is a much more difficult substance than milk or cream to test for fat content. If the acid is too strong it will carbonise part of the sugar in the

centrifugal test thus producing a burnt or charred fat column and unreliable results. From time to time various modifications have been suggested, *e.g.* the Troy-Fuseoma method and the Nebraska method. In many cases a weaker acid such as acetic or hydrochloric is substituted for sulphuric acid. In others the use of alcohol (ethyl, iso-butyl or amyl alcohol) to prevent the charring of the fat column is recommended.

The ordinary Gerber milk test was used and produced quite accurate results from diluted samples. The amounts used were :—

10 ml. H_2SO_4 of a specific gravity of 1.820 to 1.825 at 60°F.

11 ml. of a diluted sample of ice-cream of known dilution factor.

1 ml. amyl alcohol of a specific gravity of .815 to .816 at 60°F.

A double centrifugal test of each sample was carried out as follows :—

(a) at 1,100 revolutions per minute for 5 minutes ; the sample was heated to 149°F. and a reading taken ; and

(b) at 1,100 revolutions per minute for 3 minutes. The sample was again heated to 149°F.; a reading was then taken and any increase over the first reading was noted.

The majority of the samples showed no increase after the second centrifuging. Where increases were shown they ranged from .02% to .05%.

TOTAL SOLIDS.

1 gram of the diluted sample was placed in a tared aluminium dish and dehydrated on a hot plate at 180°C. The completion of the process was indicated by the residue's turning a light brown colour. A uniform rate of evaporation was ensured by keeping the sample spread evenly over the entire surface of the dish. The dish was then placed in a desiccator for 30 minutes and re-weighed. From the result, the percentage of total solids in the ice-cream was calculated as follows :—

Weight of aluminium dish = A grams.
Weight of aluminium dish + 1 gram of sample after evaporation = B grams.
Weight of solids per gram of diluted sample = B—A grams.
Percentage of total solids in the ice-cream = B—A × calculation factor × 100.

DISCUSSION OF RESULTS.

The statistics of the results are summarised in Table I at page [54] .

Total Bacterial Count. **The total bacterial count at 21°C. was found to range from 47,000 to 53,278,000 per gram with an average of 10,040,000 per gram. At 37°C. the counts ranged from 7,000 to 13,818,000 per gram with**

an average of 2,948,000 per gram. Expressed as a percentage of the count at 21°C. the count at 37°C. ranged from 8% to 46% with an average of 29.3%. The difference was due to the relatively low temperature at which many soil types grow. Hence when making a microbiological examination of a sample it is of value to incubate duplicate plates at 21°C. and 37°C. It will be evident from a study of Table I that the count at the lower temperature may reveal a hitherto unsuspected high degree of contamination with soil bacteria. For example, hardly any species of the Aerobacter group, whose presence indicates pollution with dirt or soil, grow at 37°C. and yet examination showed that they were contained in 28% of all samples and the ice-creams of only 5 of the 18 manufacturers whose products were examined were free from this group.

The count of yeasts (mainly torulae or wild yeasts) ranged from 6 to 45,391 per gram with an average of 6,087 per gram, while the count of moulds ranged from 39 to 2,778 per gram with an average of 548. The chief moulds found were *Oidium lactis*, *Penicillium* species, *Mucor* species and *Phoma* species. Since pasteurisation kills yeasts and moulds their presence in ice-cream made from a " mix " so treated is an indication of after-contamination.

Two of the three samples taken of one maker's product gave a positive reaction to the coliform test.

Anaerobic Spore-formers (*Clostridium* group) were found in 33.4% of the samples. The presence of this group can be linked with outbreaks of gastroenteritis in periods of hot weather.

Acidity (*citric acid*) ranged from .091% to .277% with an average of .150%. This high acidity content was considered to be due to the use of acid flavourings.

Fat and Total Solids. The averages of the percentage content of butter-fat and total solids (see Table II at page [55]) were respectively 4.65% and 22.52%. The range was from 1.88% to 11.65% for butter-fat and from 17.03% to 34.15% for total solids. On the basis of butter-fat content the ice-cream examined could be segregated into three groups :—

GROUP 1. *Dairy Ice-cream* made from cream, butter, milk powder and gelatine (with or without flavouring) and containing not less than 8% of butter-fat. The samples of the products of 28% of the manufacturers were in this group.

GROUP 2. *Ice-Cream*, whose composition is that of group 1 but with a fat content of less than 8%. Of the samples 6% were in this group.

GROUP 3. *Ice-Custard* whose ingredients are cornflour, milk and sugar with or without the addition of butter-fat. 66% of the samples were in this class.

CONCLUSION.

The English monthly Journal "The Ice-Cream Industry" for August, 1946, stated: "The quality of ice-cream, much of which is unsatisfactory from the standpoint of hygiene and of nutrition, is engaging increasing attention among Local Authorities and the public. Protests are pouring into the Ministry of Health and the Ministry of Food. The position is serious. So many ice-cream makers are failing to fake adequate steps to produce an hygienic product that we feel it will be in the best interests of the trade if the Government takes steps to safeguard the public health." The same issue stated: "Bank Holiday week-end was marred by an outbreak of typhoid fever at Aberystwyth. About 90 patients were taken to hospital. All the patients were stated to have bought ice-cream from the same source. The source of infection was the trader himself who was found to be a carrier of the disease." The British Ministry of Health subsequently made regulations known as the Ice-Cream (Heat Treatment) Regulations, 1946, tentatively fixed to come into force on May 1st, 1947. These state that the prepared ice-cream "mix" (as the unfrozen blend of ingredients is called) "shall be subjected to a temperature of not less than 150°F. for 30 minutes or alternatively of not less than 160°F. for 10 minutes." The Regulations further state: "After the liquid has been subjected to heat treatment as aforesaid it shall be reduced to a temperature of not more than 45°F. within 1½ hours and shall be kept at such a temperature until it is frozen in the course of the manufacture of the ice-cream."

Cream, milk and milk concentrates, and sugar form the basis of all ice-creams. To these may be added eggs, flavouring substances such as vanilla, strawberry or chocolate, fruits and nuts and a small quantity of gelatine to improve the texture of the product and to prevent the formation of gritty ice crystals. The typical basic "mix" should contain approximately these proportions and ingredients:—

80% cream and milk products;
15% sugar;
4.5% flavouring substance; and
.5% gelatine.

Fruits or nuts may weigh as much as 20% of the "mix."

The solids content of the pasteurised "mix" should consist of 10% to 12% butter-fat; at least 12% of milk solids other than butter-fat; 12 to 16%

sugar; and not more than .5% gelatine or other stabiliser. The stabiliser should be of good quality with a bacterial count of less than 20,000 per gram. when standard media are used and an incubation temperature of 70°F. for three days. The mix should, of course, be pasteurised and the freezer should be capable of reducing it to a temperature of 27°F. or lower. Ice-cream made under these conditions and conforming to these standards would contain at least 22% milk solids as well as an easily available source of energy in the form of sugar and would thus be a good food-stuff and have the advantage of taste appeal provided, of course, that it reached the consumer in a hygienic condition.

Ice-cream of high quality should further have a clean creamy flavour, a firm smooth and velvety body and texture and the natural colour of the flavouring substance used. Of the 90 odd samples examined only those from ice-cream made by a few large-scale manufacturers measured up to these standards. Those from ice-cream made in small establishments often were lacking in sweetness, coarse in texture and weak and soggy in body. Many of them were unfit for consumption as a consequence of insanitary modes of manufacture, storing and sale. On the basis of standards enforced in the United States of America, the average total bacterial count of a sample of ice-cream which is plated on standard tryptone-dextrose-agar at 37°C. for 2 days should be 250,000 per gram instead of the 2,943,000 actually found. The *Clostridium* group, which was found in one of every three samples, should not be present. It is to be feared that in general ice-cream vendors do not take sufficient care of dippers and scoops, which may be cleansed in the same pail of water all day long.

In addition to the matters dealt with above, other points which require greater attention and care are the ventilation of premises, the state of health of persons engaged in the manufacture or distribution of ice-cream and cleanliness in the packing materials.

TABLE I.

Average Result of the Samples Examined Belonging to Each Maker of Ice Cream

No.	Acidity as % Citric Acid	Total Bacterial Count in Thousands. 21°C.	Total Bacterial Count in Thousands. 37°C.	Yeasts	Moulds	Coliform Group Samples Positive	Anaerobic Spore-formers (Clostridium Group) Samples Positive
1	.149	1,355	160	4,753	168	40%	80%
2	.168	34,068	13,818	45,391	309	60%	60%
3	.159	10,177	1.217	4,783	531	20%	40%
4	.143	47	22	6	89	0%	0%
5	.091	9,110	882	2,424	760	20%	20%
6	.161	6,924	2,544	7,501	343	20%	0%
7	.136	1,370	388	775	169	66%	50%
8	—	126	14	305	599	40%	20%
9	.103	53.278	11,712	5,990	534	16%	66%
10	.131	11,703	2,000	2.592	292	60%	60%
11	.158	237	29	1,957	175	60%	20%
12	.168	3,447	712	11,340	556	0%	16%
13	.140	13,821	6,180	15,168	800	0%	40%
14	.277	25.489	11,696	1.635	341	20%	20%
15	.144	1,909	696	369	61	0%	20%
16	.166	288	7	162	1,269	40%	20%
17	.136	2.110	465	1,198	133	0%	20%
18	.126	5,324	427	3,215	2,778	40%	50%
AVERAGE	.150	10,040	2,943	6,087	548	28%	33%

TABLE .II

Maker	Average Fat %	Average Total Solids %
1	3.11	21.59
2	2.37	17.03
3	2.80	18.71
4	11.65	34.15
5	2.09	19.31
6	3.85	25.98
7	3.72	23.72
8	2.28	18.83
9	2.42	22.27
10	1.96	20.22
11	8.10	25.51
12	3.21	24.15
13	4.00	24.82
14	3.45	18.78
15	1.88	19.77
16	9.01	22.97
17	8.53	24.28
18	9.29	23.25
AVERAGE	4.65	22.52

THE COMPOSITION AND DIGESTIBILITY OF IRISH HAY

By

J. J. Ryan, M.Sc., A.R.C.Sc.I.

Dairy Chemistry Department, University College, Cork.

Hay is undoubtedly one of the most important commodities in the economy of Irish farming, forming the greater part of the winter food supply. Nevertheless, few data are available as to its composition and nutritive value. Its quality is usually judged from appearance, the assessor being guided by its colour, amount of leaf, etc. How far wide of the mark an opinion of the feeding quality of hay may be when judged by visual examination has been shown by Watson and Ferguson (1).

In this country it is the general practice to allow the grass intended for hay to grow to an advanced stage of maturity. The usual cutting time is July when the yield is highest. Sometimes the cutting is delayed until August. Grass cut so late in the season shows, in general, a low crude protein content and sometimes a very high fibre content, and thus a retrogression in quality.

In the course of some feeding experiments carried out at University College, Cork, farm a series of analyses of samples of hay were made. The results would appear, especially if the crude protein content is compared with the standards given in "Rations for Livestock" (2), to class them as hays of poor quality.

In the light of the information gained by those preliminary analyses, it was decided to investigate more widely the composition of samples of hay from the counties of Munster. A few digestion experiments were also carried out in order to arrive at some idea of its approximate feeding value. It is realised that a much more extensive survey of the composition of Irish hay must be made and many more digestion experiments carried out in order to arrive at a true estimation of its nutritive value, but the present interim results appear to be worth recording.

Table I shows the chemical composition of 36 samples of hay examined over a number of years. All samples were taken during feeding time. Many of them showed signs of over-weathering; a few, notably No. 3 showed signs of prolonged exposure to rain.

TABLE I.

COMPOSITION OF HAY SAMPLES ARRANGED IN ASCENDING ORDER OF PROTEIN CONTENT.

No.	Moisture %	Crude Protein %	Ether Extract %	N-free Extract %	Crude Fibre %	Ash %
1	12.90	4.10	1.60	51.15	25.05	5.20
2	12.96	4.90	1.40	43.62	31.20	5.92
3	17.70	5.00	1.80	38.05	32.70	4.75
4	10.95	5.36	1.10	48.97	28.60	5.02
5	12.36	5.50	1.40	43.54	32.50	4.70
6	12.98	5.50	1.38	47.01	27.72	5.38
7	9.90	5.70	0.93	43.55	35.02	4.90
8	13.47	5.80	1.30	45.33	29.50	4.60
9	13.30	5.80	1.50	45.14	29.60	4.66
10	13.20	5.81	1.40	47.17	27.20	5.22
11	13.80	5.83	1.30	49.57	24.90	4.60
12	11.80	5.89	.95	46.13	29.53	5.70
13	13.54	5.90	1.74	40.32	32.60	5.90
14	13.45	5.98	1.07	47.62	25.87	6.01
15	12.46	6.10	1.30	41.47	32.70	5.97
16	11.40	6.12	1.20	48.88	26.30	6.10
17	18.00	6.15	1.40	41.12	27.76	5.57
18	14.50	6.38	1.64	37.68	33.50	6.30
19	13.06	6.40	1.08	46.74	26.80	5.92
20	12.93	6.60	1.38	50.71	24.05	4.33
21	12.43	6.63	1.27	39.96	33.49	6.22
22	13.90	6.66	0.90	44.02	27.88	6.64
23	13.01	6.80	1.24	43.32	29.17	6.46
24	16.80	6.90	1.30	41.15	27.47	6.38
25	14.44	7.00	1.15	42.19	28.44	6.78
26	13.86	7.04	1.48	43.27	29.75	4.60
27	13.34	7.23	1.43	43.32	28.40	6.28
28	12.20	7.48	1.35	44.45	27.90	6.62
29	12.26	7.50	1.30	47.41	26.70	4.83
30	14.46	7.53	0.96	44.09	27.00	5.96
31	14.18	7.66	1.37	39.13	31.75	5.91
32	13.37	8.10	1.12	44.03	27.35	6.03
33	13.60	8.13	1.49	42.78	28.40	5.60
34	12.70	8.50	1.13	40.77	30.16	6.74
35	13.30	8.95	1.35	42.73	28.05	5.62
36	14.80	9.70	0.94	42.16	26.50	5.90

The results show an average value for crude protein of 6.57 per cent., the individual values ranging from 4.10 to 9.7; in 5 samples only does crude protein exceed 8 per cent. Values given by Drew and his co-workers (3) for crude protein range from 5.36 to 9.19 for 4 samples of hay. Senior and Sheehy (4) record a crude protein content of 7.83 (dry matter basis) for a sample of medium quality hay.

The crude fibre content ranged from 24 to 35 per cent. with an average value of 29.0. The percentage of ash is in many cases low also. Calcium and phosphorus were estimated in 5 of the samples. Results for these elements are not shown in the table but the percentages found ranged from 0.6 to 1.22 CaO and from 0.25 to 0.44 P_2O_5.

The composition of Irish hay, as shown by Table I, with its generally low protein coupled sometimes with low fibre, makes it difficult to classify it according to the tables given in "Rations for Livestock" (2). The low protein content would, in general, cause it to be regarded as poor quality, whereas the low crude fibre would, in many cases, allow it to be classified as good quality.

Digestion experiments were carried out on 3 samples obtained from different localities, *viz.*, Nos. 14, 19 and 22. The percentages of "true protein" in these samples were 5.08, 5.30 and 5.17 respectively. Two sheep were selected for each experiment and the collection period of the fæces in each case extended over 10 days. The digestibility co-efficients, calculated from the analytical data in the usual way, are given in Table II.

TABLE II.

DIGESTIBILITY CO-EFFICIENTS.

	Sample No. No. 14	No. 19	No. 22
Crude Protein:			
Sheep I	35.72	36.10	37.80
Sheep II	38.16	36.20	38.40
Average of I and II	36.94	36.15	38.10
"True Protein":			
Sheep I	35.60	37.35	43.00
Sheep II	39.10	35.16	40.50
Average of I and II	37.35	36.26	41.75
Ether Extract:			
Sheep I	40.00	37.30	39.20
Sheep II	24.40	30.30	33.30
Average of I and II	32.20	33.80	36.25
Nitrogen-free Extract:			
Sheep I	61.87	67.70	59.90
Sheep II	60.96	64.60	60.60
Average of I and II	61.42	66.15	60.25
Crude Fibre:			
Sheep I	61.02	67.00	63.10
Sheep II	59.06	64.40	65.00
Average of I and II	60.04	65.70	64.05

In Table III are given the amounts of the various digestible constituents and the total digestible nutrients (digestible crude protein + digestible nitrogen-free extract + digestible fibre + 2.3 times digestible ether extract) per 100 lbs. of hay.

TABLE III.

DIGESTIBLE CONSTITUENTS AND TOTAL DIGESTIBLE NUTRIENTS
(as lbs. per 100 lbs. of Hay).

Sample No.	Digest. Crude Protein	Digest. "True" Protein	Digest. Ether Extract	Digest. N-free Extract	Digest. Crude Fibre	Total Digest. Nutrients
	lb.	lb.	lb.	lb.	lb.	lb.
14	2.21	1.90	0.34	29.24	15.53	47.76
19	2.31	1.92	0.37	30.92	17.60	51.68
22	2.54	2.16	0.33	26.52	17.86	47.68

Table II shows that the digestibility of the crude protein is rather low, with an average figure of 37.06 per cent. On the other hand, the digestibility coefficients of the N-free extract and crude fibre are high, being on an average 62.6 and 63.26 respectively. The digestibility figures, in general, agree more or less with those obtained by Senior and Sheehy (4) for a sample of medium quality hay. The average value for total digestible nutrients, as given by Table III, is 49.04, as compared with 46.68 obtained by Senior and Sheehy (4), both on the basis of the original hay.

Starch and protein equivalent values are widely used in evaluating feeding stuffs. Suggestions have, from time to time, been put forward for arriving at these values for hay from its chemical composition. One of the most useful contributions in this respect has been by Watson and co-workers (5, 1). Utilizing all available data they have developed regression equations from which the protein equivalent can be calculated from the crude protein, and the starch equivalent from the crude protein and the crude fibre.

They found, in general, that the values calculated by the equations they developed agreed reasonably well with those determined by digestibility experiments, Kellner's (6) method being used for ascertaining the starch equivalent. Their equations are given by Watson (7) in the form:

Starch Equivalent = 77.136—0.5297 (crude protein + 2 fibre).
Protein Equivalent = 0.6992 (crude protein)—2.148.

In using the equations the crude protein and the crude fibre are on a dry matter basis, and the starch and protein equivalent values thus obtained are then corrected for the percentage moisture in the original hay.

In Table IV columns 2 and 5, are given the starch and protein equivalents for the 3 samples of Irish hay, obtained as a result of the digestibility experiments mentioned. In calculating the starch equivalent, 0.58 starch units are subtracted from the total for each per cent. of crude fibre, as recommended by Kellner (6). The protein equivalent has been taken as the arithmetic mean of the percentages of digestible crude and digestible pure protein, as suggested in "Rations for Livestock" (2).

In columns 3 and 6 are given the corresponding starch and protein equivalents, calculated by the regression equations of Watson (7).

TABLE IV.

STARCH AND PROTEIN EQUIVALENT VALUES AS DETERMINED BY EXPERIMENT AND AS CALCULATED FROM EQUATIONS

Sample No.	Kellner Starch Equivalent		"Corrected" Starch Equivalent	Protein Equivalent	
	Determined	Calculated		Determined	Calculated
	(2)	(3)	(4)	(5)	(6)
14	32.21	36.20	38.65	2.06	2.31
19	35.50	35.30	42.60	2.12	2.60
22	30.87	33.35	37.04	2.35	2.80

The number of samples investigated is rather small for very definite conclusions. It can be seen, however, that there is close enough agreement between the experimentally determined and the calculated values to suggest that the formulæ of Watson (7) might be of use in calculating approximate values for starch and protein equivalents of Irish hay from its content of crude protein and fibre.

Both the experimentally determined and the calculated starch equivalent values given in columns 2 and 3, Table IV, are Kellner starch Equivalents. In recent editions of "Rations for Livestock" (2) starch equivalents obtained by Kellner's (6) method have been increased by 20 per cent. to bring them into line with American values which are based on the nett-energy work of Armsby (1917). These "corrected" values are also given in the Table, column 4, for the case of the "determined" values.

The "corrected" values for the starch equivalent of the 8 samples of hay would, when compared with the standards laid down in "Rations for Livestock", appear to place the hay in the category of good quality. The protein equivalent, on the other hand, is much lower than that associated with hay of this description.

ACKNOWLEDGMENT.

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SUMMARY.

1. Data presented on the chemical composition of Munster hay shows it to be, in general, low in crude protein, sometimes accompanied, however, by low fibre content.

2. Digestibility co-efficients for a limited number of samples are recorded. These show low values for the digestibility of the crude protein and high values for that of the N-free extract and fibre.

3. The results indicate that from the point of view of starch equivalent the hays could be regarded as of good quality; the protein equivalent, however, is considerably lower than that recorded in standard tables for good quality hay.

4. Starch and protein equivalent values calculated by the formulæ of Watson and co-workers agree well with those determined by digestibility experiments. The use of the formulæ is recommended for calculating the approximate feeding value of Irish hay.

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RE-SEEDING OF PASTURE TRIAL, 1944-47 (County Wexford)

By

M. T. CONNOLLY, B.Agr.Sc., Chief Agricultural Officer, Co. Wexford Committee of Agriculture.

Under the direction of the Department of Agriculture a number of trials on the direct re-seeding of unproductive pastures was laid down at various centres in this country by Agricultural Instructors in 1944.

In South Wexford one trial of this kind was conducted on the farm of Mr. Simon Murphy, Clonsharra, Ramsgrange. A field of eighteen statute acres was divided into two equal plots by the erection of a strong wire fence. The field had been under grass for fourteen years and, while affording a reasonable amount of grazing, it could be classed as poor unproductive pasture. Some Perennial Ryegrass was present but the predominant species were Sweet Vernal and Yorkshire Fog.

Results of the trial for the seasons 1944, 1945, and 1946 are given hereunder.

REPORT FOR SEASON, 1944.

The plot to be re-seeded was ploughed about 4½" deep on April 5th to 7th; subsequently it was heavily rolled, harrowed three times and rolled again. The seeds were then sown, after which the plot received a light harrowing and was rolled again. Date of sowing was 24th April. The seeds mixture per statute acre was:—

Italian Ryegrass	8 lb.
Perennial ,, ...	18 ,,
Cocksfoot	6 ,,
Timothy	8 ,,
Late-Flowering Red Clover	8 ,,
Wild White Clover	1 ,,

3 cwt. Superphosphate per statute acre was applied on 26th April to each plot. The pH of a composite sample of soil from both plots which was submitted to the Department of Agriculture for test proved to be 8.2. In spite of this high pH figure it was decided, for experimental purposes, to lime one statute acre in each plot. Ground Caustic Lime was applied at the rate of 1 ton per statute acre, and the limed plots were carefully marked.

The weather after sowing was extremely dry, and, as the plot was on a high, hilly situation, conditions for germination and establishment could not have been more unsatisfactory. The plot was rolled with a heavy roller several times, and, in spite of the dry condition, germination and establishment were reasonably good. There was, however, practically no growth until early July, when, with the advent of rain, there was extremely rapid growth.

The old pasture plot also suffered from the very dry conditions, and was not ready for grazing until 24th June, on which date ten bullocks, $1\frac{1}{2}$ to 2 years old, were put on.

On 20th July ten cattle of similar type and age as had been put on the old pasture plots, were put on the re-seeded plot. On 25th July ten more cattle were put on this plot, and, as it was found that the plot showed a tendency to get coarse, on 27th July eight strong cattle $3\frac{1}{2}$ years old were put on. The latter eight were removed on 2nd August.

Owing to the very dry, warm weather during the first half of August, the plots assumed a stunted, wilted appearance, and it was found necessary to take the cattle off both plots on 18th August.

On 9th September, ten cattle were put back on both plots. On 5th October the cattle were finally removed from the old pasture plot, and on 28th October from the re-seeded plot.

Plots Compared, 1944.

The re-seeded plot gave 1,060 cattle grazing days, the old pasture 810. A cattle grazing day is defined as the grazing of a bullock for one day. The cattle on both plots made good progress and exhibited good health and bloom.

REPORT FOR SEASON, 1945.

The outstanding difference in the plots in 1945 as compared with 1944 was the very much earlier growth of the re-seeded plot. This plot, from mid-March onwards, exhibited a rich green growth of succulent and high quality pasture, and on the date of first grazing—10th April—was very advanced.

The old pasture plot was three weeks later in starting growth. On date of stocking—10th April—there was a reasonable growth of fair quality herbage.

During the year cattle were weighed before going on to the plots, and when taken off, with a view to obtaining the live weight increases produced by each plot.

Records for grazing period and weight increase are:—

Re-Seeded Plot.

No. and Class of Cattle	Date put on	Date Taken off	Total Increase			Average Increase			Average Daily Increase
			cwt.	qrs.	lb.	cwt.	qrs.	lb.	lb.
10 Bullocks	April 10th	May 26th	14	0	14	1	1	18.2	3.4
1 ,,	April 10th	May 16th	1	0	16	1	0	16	3.5
5 ,,	April 18th	May 26th	7	2	0	1	2	0	4.6
2 ,,	April 18th	May 16th	2	1	16	1	0	22	4.7
6 ,,	May 3rd	May 26th	1	2	24	0	1	4	1.4
8 ,,	June 11th	Sept. 14th	8	2	24	1	0	10	1.3
2 ,,	June 11th	July 21st	1	0	0	0	2	0	1.4
2 ,,	July 21st	Sept. 14th	0	2	12	0	1	6	0.6
9 ..	Oct. 23rd	Nov. 27th	4	0	18	0	1	23.8	1.5
1 ,,	Oct. 23rd	Nov. 15th	0	0	14	0	0	14	0.6
6 ,,	Nov. 15th	Nov. 27th	0	2	2	0	0	9.7	0.8

Old Pasture Plot.

No. and Class of Cattle	Date put on	Date Taken off	Total Increase			Average Increase			Average Daily Increase
			cwt.	qrs.	lb.	cwt.	qrs.	lb.	lb.
3 Bullocks	April 10th	May 26th	4	3	2	1	2	10	3.9
1 ,,	April 10th	July 21st	2	2	0	2	2	0	2.7
5 ,,	April 10th	May 16th	6	3	8	1	1	13	4.2
4 ,,	May 16th	Sept. 15th	8	3	18	2	0	25.4	2.04
1 ,,	May 16th	July 21st	1	2	14	1	2	14	2.8
3 ,,	May 26th	Sept. 15th	4	3	6	1	2	11	1.6
2 ,,	July 21st	Sept. 15th	3	1	0	1	2	14	3.2
7 ,,	Sept. 29th	Nov. 2nd	1	0	17	0	0	18.4	.5

Plots Compared, 1945

	Re-seeded Plot			Old Pasture Plot		
	cwt.	qrs.	lb.	cwt.	qrs.	lb.
Total Increase in Live Weight in Stock	42	0	0	33	3	9
Increase in Live Weight in Stock per statute acre	4	2	19	3	3	1
Average daily increase per animal ..	2.2 lb.			2.6 lb.		
Total number of Cattle Grazing Days	2,240			1,660		
Total number of Cattle Grazing Days per statute acre ..	248.8			184.4		

Remarks:

The cattle used in the experiment were all 2½ to 3-year-old bullocks. The animals, which were put on the plots in April, were very good quality forward stores which had been particularly well wintered. Many of them were ready for the butcher before the end of July, and were sold off as they came to hand.

It will be observed that during April and early May, the cattle on both plots showed remarkably high live weight increases, but from late May onwards showed a sharp drop. This was particularly true of the re-seeded plot, and can be explained by the fact that in April and early May the grass on that plot was fine, leafy and succulent, but in late May, June and July, it was coarse and stemmy. This coarseness in the grass as early as mid-May was, in part, due to the pasture being too far advanced on date of first grazing—10th April.

REPORT FOR SEASON, 1946.

Re-Seeded Plot.

No. and Class of Cattle	Date put on	Date Taken off	Total Increase			Average Increase			Average Daily Increase
			cwt.	qrs.	lb.	cwt.	qrs.	lb.	lb.
8 Bullocks	April 23rd	May 25th	4	2	5	0	2	7.62	1.99
10 ,,	June 5th	July 12th	12	2	12	1	1	1.2	3.8
5 ,,	June 11th	July 12th	2	3	24	0	2	10.4	2.1
12 ,,	Aug. 2nd	Sept. 3rd	2	2	2	0	0	23.5	0.73
1 ,,	Sept. 3rd	Sept. 13th	0	0	8	0	0	8.0	0.8
9 ,,	Sept. 3rd	Sept. 26th	0	3	4	0	0	9.8	0.43

Total number of Grazing Days—1,382.
Live weight increase per statute acre—2 cwt. 2 qrs. 12.3 lb.
Average Daily Gain per animal—1.6 lb.

Old Pasture Plot.

No. and Class of Cattle	Date put on	Date Taken off	Total Increase			Average Increase			Average Daily Increase
			cwt.	qr.	lb.	cwt.	qr.	lb.	lb.
8 Bullocks	April 23rd	May 25th	4	0	18	0	2	2.25	1.82
5 ,,	June 5th	Aug. 2nd	6	1	16	1	1	3.2	2.4
1 ,,	June 5th	July 12th	0	3	14	0	3	14.0	2.7
8 ,,	Aug. 2nd	Sept. 3rd	1	3	9	0	0	25.6	0.8
11 ,,	Sept. 3rd	Sept. 26th	1	1	12	0	0	13.3	0.6
2 ,,	Sept. 3rd	Sept. 20th	0	0	24	0	0	12.0	0.71

Total number of Grazing Days—1,126.
Live weight increase per statute acre—1 cwt. 2 qrs. 16.6 lb.
Average Daily Increase per animal—1.5 lb.

Plots Compared, 1946.

	Re-seeded Plot			Old Pasture Plot		
	cwt.	qrs.	lb.	cwt.	qrs.	lb.
Total increase in Live Weight in Stock	23	1	27	14	3	9
Increase in Live Weight in Stock per statute acre	2	2	12.3	1	2	16.6
Average daily increase per animal..	1.6 lb.			1.5 lb.		
Total number of Grazing Days ..	1,382			1,126		

The limed plots were kept under careful observation during the three seasons, and, at no stage, could any difference be noticed between them and the unlimed portions of the respective plots in which they were established.

REMARKS

It will be observed that both plots were much down in production of live weight increase per statute acre as compared with the previous season. This was due to the fact that the 1945 grazing season was much superior to that of 1946. In the spring of 1945, cattle were put on to the plots on 10th April and at that date there was an abundance of excellent quality herbage; growth on both plots was excellent up to the end of June, and the plots were, therefore, carrying a maximum number of cattle per acre during the season of the year that they make optimum live weight increase.

In 1946, grazing did not commence until 23rd April and growth was backward during May and June.

Results over the three seasons in so far as they relate to total amount of grazing afforded, and to amount of live-weight increase produced are definitely in favour of the re-seeded plot. There are, however, other important considerations, chief of which is the cost of re-seeding. At this centre, cost per statute acre of re-seeding was as follows :—

	£	s.	d.
Cost of Seeds	3	12	1
Ploughing (with tractor)	1	5	0
Harrowing (4 times with tractor) ..	0	16	0
Rolling (3 times with horse)	0	6	0
Sowing of Seeds	0	1	0
Cost per statute acre	£6	0	1

The re-seeded plot cost therefore £6 0s. 1d. per statute acre more than the old pasture plot. The cost of manures applied was £2 2s. 0d. per acre on both plots, which brings total cost of re-seeded plot per statute acre up to £8 4s. 1d. (allowing 2s. per acre for spreading the manure).

Another important consideration is that the re-seeded pastures require much more careful management than old pastures. It will be found that newly re-seeded pastures give maximum growth during spring and early summer, and, if they are not heavily grazed during that period, show a tendency to get coarse and stemmy. From early autumn, the re-seeded pastures do not give much grazing, and require to be rested during the winter.

MAIZE GROWING TRIALS

Trials conducted by the Department of Agriculture on a number of occasions to test the possibility of growing maize for grain production in this country gave little hope of success.

In recent years a French variety, Jaune Gros du Domaine, which appeared from results obtained with it in Great Britain to be the one most likely to succeed under our conditions, was tested at the Department's farms at Athenry, County Galway. Ballyhaise. County Cavan and Clonakilty, County Cork. Although the crops were sown towards the end of April or in May and were allowed to stand until well into October, no ripe cobs were produced.

In 1944, a Dutch variety, Golden Standard, was reported to have given promising results in England whence a supply of seed was procured for trial on a small scale in 1945 at two of the Department's farms mentioned above, and also at Johnstown Castle Agricultural College, County Wexford, and at the Cereal Station, Ballinacurra, County Cork. The trials were repeated in 1946 with seed produced from the 1945 plots. The seed was, as far as possible, sown in square plots with a view to facilitating pollination of the plants. The following observations on the conditions under which the plants were grown and the results obtained were recorded.

1945.

At Athenry, the plots were sown after lea oats. Farmyard manure at the rate of 15 tons per statute acre was ploughed in and sulphate of ammonia and superphosphate at the rate of 1 and 4 cwt., respectively, per acre, were applied immediately before sowing. The seed was sown by hand on the 18th May at two different spacings (1) 5 to 7 seeds placed together at 36 inch intervals in 20 inch rows, and (2) 2 seeds together at 8 inch intervals in 26 inch rows. The seedlings were emerging by June 1st and a good braird developed. Threads were used to deter birds. Flowering was general in mid-August and the first cob appeared on the 23rd. Development and ripening of the cobs were very slow. By 24th October about ½ dozen cobs were matured and these were taken into a greenhouse to dry. Further cobs were picked on the 7th and 21st November. A considerable part of the crop did not mature although the harvest weather at Athenry was considered to be very favourable for maturing grain. Not more than one ripe cob was produced on any plant and few plants bore more than two cobs. The plants spaced at 8 inches apart in the rows differed from those at 36 inch intervals only in that they were later in ripening than the latter. The yield was at the rate of 5 cwt. of ripe cobs per acre.

Moulds tended to develop very rapidly on all cobs after harvesting, irrespective of degree of ripeness, but they were controlled by (1) immersion for one minute in a 5% solution of formalin, and (2) kiln drying.

At Clonakilty, two plots were sown after lea oats and manured at the rate of 15 tons farmyard manure, 4 cwt. superphosphate and 1 cwt. sulphate of potash per acre. Two or three seeds were sown together at intervals of 8 inches in 18 inch rows. Sowings were made on the 8th and 18th May and the seedlings appeared above ground about the 24th and 30th May, respectively. Many seeds did not germinate and of those that did, only about a quarter produced mature plants. Some plants died off after a week or two of poor growth, while others remained stunted and weak and were thinly scattered over the plots. Weeds tended to grow rapidly. Those plants which did form cobs produced two or three each but not more than one of these on each plant ripened. The first picking of mature cobs was made on the 29th October. Some of these were placed in a heated house and were dried hard in about a fortnight. Others which were hung in a well ventilated, unheated loft dried very little and developed mould growth. Cobs of a second picking made on 9th November had improved very little since the date of the first picking (29th October) and the grain when dried was shrivelled. There was no difference evident at the time of harvesting between the plants sown on different dates. None of the cobs filled with grain to the top. One plot was 36 and the other 16 square perches in area and the total weight of grain obtained was 7 lb. corresponding to 1½ stone from an acre.

At Johnstown Castle, three sowings were made in the field, after lea, at weekly intervals, the first on 9th May. Farmyard manure was applied at the rate of about 15 tons per statute acre. Germination was not good and the crop was consequently thin (considered to be only quarter of a full crop) and the plants did not appear vigorous at any stage. The seed was placed at 9, 12, 15 and 18 inches in 26 inch drills, but any difference which might result was obscured by the thin and irregular stand of plants obtained. The plants averaged about 8 feet 9 inches in height with 3 or 4 cobs on each. The crop was harvested on 14th November when the grain was firm and yellow and the surrounding leaves brown and hard. The first sowing was noticeably riper than the third. The yield was at the rate of 3½ cwt. per acre.

At the Cereal Station, a plot of 32 square yards was sown on 24th April, the seeds being dibbled singly at 6 inches apart in 18 inch rows. The plants were healthy and grew vigorously to about 6 feet high. There were some casualties due to insect and hoe damage and the number of surviving plants was 120. Six cobs were picked on 9th October, 64 on 15th, 48 on 22nd and 30 on 25th. There was, however, very little further development in the cobs remaining after the first picking. On only a few cobs did the covering leaves lose their green colour. All cobs were firm, with firm, but not hard, pale to deep yellow

seed. Seed colour deepened as drying out proceeded after harvest. The degree of maturation of the seed varied from cob to cob and on individual cobs from base to tip. The best cobs carried about 450 grains, all well filled, were about 7 inches long and 1¼ to 1½ inch in diameter. The worst cobs carried about 50 good grains. The majority had reasonably good grain and were 4 to 6 inches long with 1 to 2 inches of infertile tips. The cobs, after picking, were hung before a kiln fire where the moisture content was gradually reduced to about 12%. The grains were separated by rubbing the cobs together. The grain sample was good and would compare favourably with imported maize. The total amount of grain obtained was 11 lb., equivalent to about 15 cwt. per acre.

1946.

At Athenry, the plots were sown after lea oats. A dressing of farmyard manure at the rate of 20 tons per acre was ploughed into the soil in spring and a fine, firm seed bed was prepared. Sowings were made on the 26th April and on 3rd and 10th May, the seed being dibbled at 9 inch intervals in rows 2 feet apart. Strong seedlings raised in frames were also planted at the same spacings on the 3rd May. Although, owing to dry weather, germination of all the seed was slow, a full stand of seedlings was produced. As growth of these was retarded by adverse weather, a top-dressing of nitrate of soda was given in June. Attacks by slugs in the early stages, and later by birds, were controlled before significant damage was caused. Weather conditions during the summer and autumn were very unfavourable and about two-thirds of the plants died out. Those which survived remained stunted and, although many of them flowered, none produced mature seed. The date of sowing had no apparent effect eventually on the development of the plants. The plants raised in the frames, although more forward in the early stages, were no better towards the end of the growing season than those grown from seed in the field.

At Clonakilty, sowings were made on the 2nd, 9th and 28th May following lea oats. The ground was manured at the rate of 15 tons farmyard manure and 4 cwt. superphosphate per acre. The spacing was the same as at Athenry. Germination was slow in this case also owing to dry weather and the plants remained weak and pale until mid-July. Although there was then some indication of improvement in growth, the plants remained stunted, commenced to form cobs only in October and did not produce seed. A few plants sown in the greenhouse at the same time as those sown outdoor grew very tall and produced good cobs.

At Johnstown Castle, the sowings made in the field were almost completely destroyed by rooks. Some plants raised in a greenhouse and then planted in the field made very poor growth and did not produce seed.

At the Cereal Station, sowings made on different dates in a plot of about one-third acre were completely destroyed by rooks despite efforts to prevent

their depredations. The seed of a few selected cobs of the previous season which was sown in another field escaped damage by rooks but failed to produce mature seed.

Briefly, the results of the trials with the variety Golden Standard were as follows:—

In 1945 the plants, except those at the Cereal Station, mostly failed to mature properly and produced small yields of grain. Unless artifically dried after removing them from the plants, the cobs tended to develop mould growth.

In the unfavourable season of 1946 the crop was, at the four centres, a total failure from the point of view of grain production.

It has been the experience in these and earlier trials that rooks may be a great menace to maize after it is sown and once they attack a crop it is difficult to repel them.

In general these trials indicate that, even in a reasonably favourable season and working with varieties calculated to be best suited to climatic conditions in this country, the cultivation of maize for grain production has little hope of success.

PRODUCTION OF LINSEED

The flax plant is utilised as a source of fibre and oil which are valuable industrially and commercially. There arises also as a by-product in the production of oil from the seed, linseed cake, cubes or meal. Flax is, therefore, of value in agriculture as a cash crop and as a source of nutritious, protein-rich stock food.

Flax has long been grown successfully as a fibre crop in this country, and attempts have been made from time to time to utilise the crop as a source of linseed for use in industry or as a feeding stuff. About the middle of the last century individual growers saved some seed from flax grown for fibre by rippling it prior to retting. In the seasons 1902-06, inclusive, the Department of Agriculture conducted a series of trials with a view to ascertaining whether feeding linseed could be obtained economically in this way. In individual trials similar quantities of flax from the same crop were (*a*) de-seeded before retting and (*b*) retted in the usual way without de-seeding, both lots being treated alike subsequently. It was found that when the flax was rippled so as to leave the fibre comparatively undamaged, it was only in the case of flax carrying a heavy crop of bolls that the quantity of seed obtained was sufficient to pay for the extra labour involved. As a result of a similar trial in 1941, reported by the Instructor in Agriculture for Co. Monaghan, it was concluded that although the rippling did not adversely affect the quantity or quality of the scutched fibre, the amount of seed obtained—approximately 2½ cwt. per statute acre—did not pay for the cost of rippling.

During the seasons 1928-'30, trials in the saving of seed only from the crop were carried out at the farms attached to the Department's Schools at Athenry, Ballyhaise and Clonakilty, using Plate linseed, a seed-producing type from Argentina. In 1928, the crop at Ballyhaise germinated thinly, was checked in growth by subsequent wet weather and became a complete failure. Yields at the rate of approximately 6 and 8 cwt. per statute acre were obtained at Clonakilty and at Athenry, respectively. The trials were repeated in 1929, yields of 8 cwt., 5 cwt. and 10 cwt. per statute acre being obtained. A plot of the fibre-producing variety Riga Child was grown alongside the Plate linseed at Ballyhaise and yielded 3½ cwt. of seed per acre as compared with 5 cwt. for Plate. Similar plots were sown at the three farms in 1930. The crops were so lodged and damaged by wet weather and weed growth during the late summer of this season that they were considered to be not worth de-seeding.

Trial plots of flax, each one statute acre in area, were sown on three farms in Co. Dublin and at the Department's farm at Ballyhaise in 1937 with a view to the production of linseed. The fibre varieties Liral Crown, Stormont Gossamer and Stormont Cirus were used in Co. Dublin and yielded respectively, 9⅛, 6¼ and 6 cwts. of seed per acre. Liral Crown was used at Ballyhaise and produced 9⅛ cwt. of seed.

Further trials in linseed production with four fibre varieties and Plate linseed were conducted at the Department's farms in 1989. The plots, each a quarter of a statute acre in area, were sown in the latter part of April at about two-thirds the rate of normal seeding then practised for fibre production, in the hope that the lower rate of seeding would encourage branching and reduce tendency to lodging. The Plate linseed produced short straw and became badly overgrown with weeds. It was, in consequence, a complete failure at Athenry. All varieties were extensively affected by Seedling Blight at Ballyhaise. The produce of the plots was, when harvested, stored until spring for de-seeding. Some damage to the stored produce was caused by vermin, particularly in the case of the variety Concurrent at Athenry, and as the quantity of seed obtained by de-seeding in this particular instance could not be regarded as a measure of the yield from the plot, the figure has not been included. Liral Crown was included at Ballyhaise only. The yields of seed per statute acre were as follows:—

	Liral Crown			Liral Monarch			Stormont Gossamer			Concurrent			Plate		
	c.	*q.*	*lb.*	*c.*	*q.*	*lb.*	*c.*	*q.*	*lb.*	*c.*	*q.*	*lb.*	*c.*	*q.*	*lb.*
BALLYHAISE ..	10	0	0	7	2	0	7	0	0	10	2	0	3	2	0
CLONAKILTY ..		–		12	0	21	9	3	20	12	3	20	8	1	20
ATHENRY ..		–		7	3	12	6	2	16					—	

Commercial seed crops of Liral Crown and Liral Prince were grown on clean, well-cultivated land at Ballyhaise and Clonakilty in 1940. The yields per statute acre were:—

	Liral Crown		Liral Prince	
	c.	*q.*	*c.*	*q.*
BALLYHAISE	11	0	6	3
CLONAKILTY	11	0	11	2

The varieties of flax used in the trials mentioned so far were, with the exception of Plate linseed, those which, at the time, were normally used for the production of fibre. In 1939, small sample lots of seed of a number of varieties which were said to have been developed for seed production, were procured from U.S.A. The varieties thus procured were Bison, Boley Golden, Buda,

Newlands, Redwing and Rio. Small-scale observation and trial plots with these varieties were grown at the Cereal Station, Ballinacurra in 1941. Argentine (or Plate) Linseed, Liral Crown and Liral Prince were included for comparison. The varieties Boley Golden and Rio resembled Argentine Linseed in having relatively large seed and short, weak, branched stems which rendered them very susceptible to suppression by weed growth. They were, therefore, in contrast with the typical fibre varieties which produce long, virtually non-branching stems. Bison, Buda, Newlands and Redwing grew stems of medium length. These four varieties also produced the highest seed yields while Liral Crown and Liral Prince produced the lowest. The latter two varieties and Redwing ripened about a week earlier than the others. These nine varieties, plus Concurrent, were again grown at the Cereal Station in 1942, mainly for the purpose of propagating the linseed varieties. The Bison, Buda, Newlands, Redwing and Concurrent plots were each about a quarter of a statute acre, the remainder being smaller. The results again showed the inferiority in respect of seed yield of the fibre varieties which produced 6 to 7¼ cwt. per statute acre as compared with 9¾ to 13 cwt. for the seed-producing types. Redwing and the Liral varieties ripened, as in the previous season, about a week earlier than the others.

Field trials with the more promising of these linseed types were conducted at the Cereal Station and the Department's farms in 1943, Argentine linseed and Concurrent being included also. At Ballyhaise, the plots were sown after grass and brairded well but heavy rains in June, July and August caused extensive lodging, weed growth and rotting of the plants on the ground which, together with removal or destruction of seed by pigeons, resulted in a negligible yield. At Athenry, the crop was sown on 8th April on light limestone soil after grass. Manure was not applied. The plots were harvested between 16th August and 9th September. It was considered that the yield of Bison was appreciably reduced as a result of a severe attack of Rust. The crop followed grass at Clonakilty also and got a dressing of Muriate of Potash at the rate of ½ cwt. per statute acre. The seed was sown on the 5th April and the crop was harvested between 29th July and 17th August. Towards the end of June all varieties lodged and were in very bad condition at time of harvesting. The plots were sown on 6th April at the Cereal Station. A satisfactory braird was established but weed growth during the season was considerable. Concurrent was considered to have suffered less than the other varieties from weed competition. The varieties grown and the yields of seed per statute acre were as follows:—

Variety	Athenry		Clonakilty		Cereal Station Ballinacurra	
	Each plot 1/5th statute acre.				Each plot 1/6th statute acre	
	cwt.	*sts.*	*cwt.*	*sts.*	*cwt.*	*sts.*
Bison	3	5	1	0	6	3
Buda	7	1	3	3	7	0
Newlands	9	1	2	5	11	2
Redwing	9	3	1	2	10	4
Argentine (Plate) Linseed	10	5	3	4	9	0
Concurrent	7	4	4	4	10	4
	Propagation plots--each 1 statute acre.					
Buda	7	0				
Newlands			3	2	---	
Redwing					8	2

In 1944 an acre of Redwing linseed was grown after lea in a fertile, medium limestone loam at Athenry. The seed (six stones) was sown on 8th April; it germinated well and a good braird was established but frost in May checked its progress. The wet summer and autumn which followed caused lodging of the crop and excessive weed growth, with the result that only 13 stones of a poor sample of linseed were obtained. In this year also, one-third statute acre of each of the varieties Bison and Buda was sown at Clonakilty after lea oats. Farmyard manure at the rate of about 15 tons per statute acre had been ploughed in the previous winter and a dressing of Muriate of Potash was applied at time of sowing. The crop was sown on April 6th. Both varieties were severely checked in growth by drought in spring and early summer. The ground was, therefore, not well covered by the flax and weeds became prevalent later. The crop was pulled on July 27th. Bison yielded at the rate of 13½ stones of linseed per statute acre and Buda 4½ cwt.

The Instructors in Agriculture arranged for the conduct of trials in the growing of linseed on 41 farms in 15 counties in 1944. The area of each plot was about ½ to 1 statute acre. The varieties used and the yields obtained, together with relevant observations, are set out in Table I. The crop was a total failure at five centres, while the yield of 6 stones per statute acre at a sixth centre may also be regarded as a failure. At 9 other centres crops yielding less than about 8 cwt. per statute acre resulted. At 18 centres yields of seed varying from about 8 cwt. to 11 cwt. per statute acre were obtained. At

13 centres the yield exceeded 11 cwt. including 3 centres where the yields were from about 14 to 16 cwt. Generally speaking, the prolonged drought in early summer and excessive rainfall later in the season were considered to be unfavourable to the crop.

Similar trials were again conducted by the Instructors in Agriculture at 32 centres in 13 counties in 1945. Results are shown in Table II. For the reasons indicated the crop was a total failure at 3 centres and was very unsatisfactory at 7 other centres where the yield was only about 4 cwt. or less per statute acre. At 13 centres the yield was 8 cwt. or more per acre but in no case did it exceed 11 cwt.

SUMMARY.

Trials in the growing of linseed were conducted at the Department's institutions in ten seasons between 1928 and 1944 and by the Instructors in Agriculture at 73 centres throughout the country during 1944 and 1945. The varieties used comprised a number of those grown for fibre production. Argentine or Plate linseed and six linseed varieties procured from the United States of America in 1939.

The yields were very variable and there was an unduly high proportion of failures and poor crops due mainly to lodging, weed growth or damage by vermin or birds.

The more productive of the linseed varieties proved superior in respect of seed yield to the varieties which are grown primarily for fibre production in this country. Plate linseed, however, being short-stemmed, was more susceptible to damage from weed growth and was found to be generally less suitable for cultivation than the better of the other linseed varieties used.

Table I.

	Centre	Yield in Stones per Statute Acre			Observations
		Newlands	Redwing	Buda	
Clare	1	—	—	*	Lodged badly and became infested with weeds.
	2	—	—	104	Very nice crop.
	3		—	108	Made steady growth throughout season.
	4	—	—	40	Young braird damaged by frost.
Dublin	1	—	—	*	Crop patchy. Ripened unevenly and was severely damaged by birds. Was not threshed.
	2	124	—	—	Slightly affected by Rust.
	3	*	—	—	Crop adversely affected by drought and was patchy. Weeds prevalent and damage caused by birds. Not harvested.
Galway	1	—	46	—	Crop thin and patchy.
	2	—	70	—	Satisfactory.
	3	62		—	Appeared a satisfactory crop and produced a nice sample of seed.
Kerry ..	1	—	66		Much seed lost during harvesting.
	2		84	—	— —
Kilkenny .	1	—	102	—	Early growth delayed by drought and crop infested with weeds later.
	2	—	99	—	Early growth affected by drought.
	3	84	—	—	Crop attacked by Foot-rot, Browning and Stem-break.
	4	26	—	—	Crop badly affected by same diseases.
Laoighis . .	1	—	—	72	Badly infested with weeds.
	2	116	80	130	Made rather slow, uneven early growth due to drought. Fair amount of Seedling Blight in all plots.
	3	72	96	96	Progress very slow at first and uneven due to dry weather.
	4	—	87	—	Early progress slow. Crop infested with weeds later.
	5	—	—	78	Crop uneven throughout season.
	6	66	—	—	Badly infested with weeds.
	7	—	44	—	Crop seriously affected with weeds.
Limerick	1	—	—	96	Very satisfactory crop.
	2	—	*	—	Smothered by weeds.
Longford	1	—	65	—	Some loss of seed due to bad weather at harvest.
	2	—	50	—	Portion of crop lodged badly and could not, due to bad weather, be harvested at proper time.
Offaly	—	—	6	—	Considerable loss of seed resulted from lodging early in the season and sheding later.

*To indicate variety sown

Table I.—*continued*

	Centre	Yield in Stones per Statute Acre			Observations
		Newlands	Redwing	Buda	
Roscommon ...	1	—		72	Satisfactory crop
	2	—	—	58	
	3	—	104	—	Satisfactory crop.
	4		90	—	Do.
Tipperary, N.R. ...	1	—	—	70	Thin crop.
	2	—	—	64	Badly infested with weeds
Tipperary, S.R. ...	1	—	120	—	Satisfactory crop.
	2		48	—	Lodging of crop and damage by vermin before threshing reduced yield.
Waterford ...	1	74	—	—	Quarter of plot infested with weeds. Ripened unevenly.
	2	—	24	—	Crop grew and ripened very unevenly.
	3	—	96	—	Satisfactory crop.
Westmeath ...	—	40	—	—	Lodged badly and became infested with weeds.
Wexford	—	—	—	—	Poor establishment. Braird suppressed by weeds.

Table II.

	Centre	Yield in Stones per Statute Acre.				Observations
		Newlands	Redwing	Buda	Concurrent	
Clare	1	—	--	70	-	Slight lodging in weedy portion of crop.
	2		-	85	–	Very satisfactory crop
	3	--	-	64	--	Some seed lost due to unavoidable delay in harvesting.
	4		--	72		Some seed lost due to over-ripeness
Dublin	-	-			16	Ripened unevenly, crop was tangled, harvested late and much seed was lost.
Galway	1	--	*			Crop made poor growth from seedling stage onward, became overgrown with weeds, and was not harvested
	2		61			Crop rather patchy.
	3	28			--	Crop did not make satisfactory growth and due to weather conditions, some seed was lost at harvest
Kerry			83			Crop satisfactory
Kilkenny	1		[illegible]			Grew rank and lodged badly.
	2		52			Some lodging occurred
	3	49				Crop damaged by rainfall and lodged in patches
	4	---	60	-		
	5	-	34	-		Crop damaged by rainfall and lodged badly
	6	--	*	-		Crop lodged so badly that it was not harvested
Laoighis	1			57	--	Germination and establishment slow.
	2		-	-	--	Crop overgrown by weeds and damaged by rabbits, was not harvested.
	3	58	-	46		Crops rather badly lodged and threshing was badly done, an undue proportion of the seed being left in the straw.
	4	84		-		Slight lodging occurred
Limerick			-	84	—	—
Longford				-	66	--
Offaly	1	—	--	—	48	Portion of crop lodged somewhat.
	2	—	—	27	-	Crop patchy and ripened unevenly, due to faulty seed-bed and insect pests.
	3	-	--	33	—	Some loss of seed due to lodging.
Roscommon	1	--	--	32	—	Crop grew badly and rabbits caused some damage.
	2	—	80	—	--	—
	3	—	50	—	—	Soil was wet and crop was slow in growth and weedy
Tipperary, S.R.	1	—	80	—	—	—
	2	---	75	—	—	—
	3	—	50	—	—	Yield reduced by lodging and adverse weather at harvest.
Waterford	1	72	—	—	—	Some loss of seed due to bad harvesting weather and at threshing.
	2	82	—	—	—	Considerable lodging occurred and much seed was lost by shedding and unsuitable threshing equipment.

*To indicate variety sown

FIELD EXPERIMENTS, 1946

Experiments conducted by County Agricultural Instructors in 1946 included spring wheat and potato variety trials. Trials were also conducted with "Agroxone" for weed control. Further details of the trials in each county may be obtained by applying to the Secretary of the County Committee of Agriculture concerned.

SPRING WHEAT VARIETY TRIALS.

Trials to compare the varieties Progress, which was imported from Sweden, and Selection No. 1, from a cross between Yeoman and April Red, with Atle were conducted in 1946 by the Instructors in Agriculture at 32 centres in 18 counties.

In all but a few cases, the plots were each approximately ½ statute acre. The description of the soil at the various centres, of the cropping and manuring of the ground in the previous season (1945) and of the manuring of the wheat plots (at 11 centres) indicated that they were located on soils in reasonably fertile condition which would, generally, appear to be suited to the growing of wheat of Atle type.

Except at one centre, the plots were sown in the last week of March or the first week of April. Field germination and establishment of the seedlings were good in the three varieties, with the exception of one centre in Laoighis where Selection No. 1 germinated very thinly.

Selection No. 1 produced the most vigorous braird at 12 centres and generally made the most rank growth, with relatively broad leaf blades, throughout the season. It tended to be less erect in habit of early growth than the other varieties, and it formed a larger ear. Selection No. 1 generally grew tallest but, except in a few cases, the straw was considered to be strong. Some lodging occurred in this variety at four centres, at only one of which (in County Dublin) it was serious. As may be seen from the accompanying table, Selection No. 1 displayed a relatively low degree of resistance to attacks of fungoid diseases. From an appreciable number of centres it was reported that this variety did not withstand the unfavourable harvest weather well; it was rather liable to sprout in the ear and, generally, the grain was large, soft and, in many cases, was not as well filled as that of Progress and Atle and was of poorer quality.

Progress also produced a good braird and made steady growth throughout the season. It appears to have resisted attacks of fungoid diseases well, being

better than Atle and Selection No. 1 in this respect. The straw was of moderate length and appeared to be highly resistant to lodging. It was also noted that Progress suffered remarkably little damage from the bad harvest weather and produced the most uniform and best grain sample and the soundest straw at the majority of centres.

Atle made the weakest vegetative growth, generally had the shortest straw and produced the smallest grain.

Despite the critical season, there was no lodging in any of the three varieties at 24 centres.

The assessment of differences in the times of ripening of the varieties was rendered difficult by weather conditions at the time. Progress was found to ripen earlier than Atle by one to six days at five centres, later than it by two to ten days at 20 centres, while they ripened together at six centres. Dates of ripening were not available from one centre. Selection No. 1 ripened earlier than Progress but tended to be somewhat later than Atle. The plots were nearly all harvested in the month of September, the majority from about the middle to the end of the month.

The yields of grain obtained at 28 centres, together with observations on the extent of disease infection, are shown in the table. As the produce of the plots was not yet threshed, the yields from 4 centres—one in each of the Counties, Galway, Kilkenny, Meath and Offaly - were not available for inclusion in this report. The low yield of 6 cwt. per acre from Selection No. 1 at one centre in County Galway was attributed to the effects of the fungoid diseases present.

SUMMARY.

In these trials Selection No. 1 proved, generally, to be the least satisfactory of the three varieties ; it was less resistant to attacks of fungoid diseases, was more susceptible to damage by bad harvest weather, producing as a result inferior quality grain, and the average yield was significantly lower than that of Atle. Progress appears to resemble Atle in habit of growth and to be similarly suited to fertile soils. It made more vigorous growth than Atle and was generally more uniform, particularly in the grain sample which was somewhat larger and of better quality. It appeared to be more disease resistant and to withstand unfavourable harvest weather well. The average yield was significantly higher than that of Atle. At about 20 centres, Progress was considered by the Instructors to be a more suitable variety than Atle. It was, however, appreciably later in ripening but this defect may be less significant in more normal seasons.

County	Yield of Grain per Statute Acre						Observations on Extent of Disease Infection
	Atle		Selection No. 1		Progress		
	c.	q.	c.	q.	c.	q.	
Cork	18	1	17	1	23	2	Yellow Stripe Rust prevalent—worst on Selection No. 1.
	10	2	10	2	16	0	Ear Blight present in all plots.
	25	1	25	0	25	0	Slight attack of Mildew in Selection No. 1.
Dublin	32	3	30	2	37	0	Some Foot-rot in the three plots. Selection No. 1 affected with Ear Blight also.
	28	3	20	3	30	1	——
Galway	20	0	19	0	24	1	Much Ear Blight in Selection No. 1. Slight attack in others.
	14	3	6	0	15	3	Atle and Selection No. 1 rather badly affected by Take-all. Selection No. 1 affected by Ear Blight also.
Kerry ..	22	0	20	0	24	2	Selection No. 1 slightly affected by Ear Blight.
	18	3	16	3	19	3	Ear Blight in the three plots. Selection No. 1 most severely affected.
Kildare ..	12	0	12	1	18	3	Atle and Selection No. 1 affected by Take-all; Progress not.
Kilkenny ..	34	2	31	3	39	2	——
Laoighis ..	20	2	18	3	21	2	Progress healthy. Others slightly affected by Black Stem Rust.
	17	2	18	0	19	1	——
Limerick ..	25	0	23	0	25	2	——
Louth	25	1	20	3	24	2	——
Meath	10	2	15	2	12	0	——
Offaly	23	1	19	0	19	1	——
Roscommon ..	19	2	17	3	20	3	Slight attack of Rust and Take-All on Selection No. 1. Others healthy.
	18	1	15	3	21	3	——

County	Yield of Grain per Statute Acre			Observations on Extent of Disease Infection
	Atle	Selection No. 1	Progress	
	c. q.	c. q.	c. q.	
Tipperary N.R.	15 2	25 0	16 3	—
Tipperary S.R.	23 2	27 3	25 2	—
Waterford ..	27 2	23 3	27 0	—
	21 2	17 0	21 1	Atle slightly affected by Ear Blight.
Westmeath ..	18 2	18 3	18 1	—
Wexford ..	24 3	26 2	26 1	—
	27 2	23 0	26 3	Selection No. 1 much affected by Ear Blight; Atle slightly; Progress practically free.
Wicklow ..	27 3	22 2	26 1	—
	15 2	11 3	15 1	—
Mean (28 centres)	21 2	20 0	23 0	Standard Error = 0.48 cwt. Significant difference, 5% point = 1.3 cwt. Significant difference, 1% point = 1.8 cwt.

POTATO VARIETY TRIALS.

Trials to compare the variety Home Guard with Epicure and Arran Pilot were conducted by the Instructors in Agriculture at 58 centres in 1946. One cwt. of seed tubers of each variety was used by each Instructor. Home Guard is an immune first early variety which was introduced in 1943. The tubers are oval with shallow eyes and white skin and flesh.

The crops generally were satisfactory but at a few centres they were checked in early growth by frost and, as indicated in the footnotes to the accompanying table of yields, there were some blanks, mainly in the Arran Pilot plots, at a small number of centres.

Blight was not prevalent in the plots and there was, therefore, little opportunity of noting the comparative resistance of the varieties to it. However, of 11 reports which indicated some difference between the varieties in this respect 10 were favourable to Home Guard.

Taking the net results from the centres as a whole, the capacity of Home Guard for early maturity appears to be approximately similar to that of the other varieties tested but, as there was appreciable variation in this respect

between different centres, persons interested in the relative dates of maturity of the varieties locally might consult the Instructors in Agriculture in their districts.

At the majority of centres Home Guard was found to be of better cooking quality than either of the others and its tubers were generally considered to be of uniform and attractive size and appearance.

At 2 centres where the Epicure tubers from the plots were badly affected by common scab, those of Home Guard were only slightly affected.

The results of these trials suggest that Home Guard is a variety worthy of trial by growers of early potatoes.

Yield of Tubers Per Acre

	Date of Yield Estimate	HOME GUARD				ARRAN PILOT				EPICURE			
		Ware	Small	Ware and Small	Diseased	Ware	Small	Ware and Small	Diseased	Ware	Small	Ware and Small	Diseased
		T. C. Q.	T. C. Q.	T. C. Q.	T. C. Q.	T. C. Q	T. C Q	T. C. Q.	T. C. Q	T. C. Q.	T. C. Q.	T. C. Q.	T. C. Q.
Carlow	Oct. 2nd ...	11 9 1	1 6 0	12 15 1	—	14 2 2	1 5 1	15 7 3	—	13 0 0	1 3 2	14 3 2	—
	Aug. 24th ...	11 5 0	2 11 0	13 16 0	—	11 17 0	2 16 2	14 13 2	0 8 2	10 12 0	2 8 0	13 0 0	—
Cavan	July 30th ...	7 8 0	1 16 0	9 4 0	0 2 0	9 2 0	0 10 0	9 12 0	0 2 0	9 1 0	0 14 0	9 15 0	0 2 0
Clare	July 17th ...	8 11 2	1 10 0	10 1 2	—	7 3 0	1 11 2	8 14 2	—	8 5 3	1 15 1	10 1 0	—
	Aug. 13th & 14th ...	14 4 1	1 12 3	15 17 0	—	12 2 0	1 9 2	13 11 2	—	14 7 1	2 19 3	17 7 0	—
	Aug. 13th & 14th ...	9 5 3	1 14 1	11 0 0	—	8 11 2	1 17 1	10 8 3	—	7 14 1	2 17 1	10 11 2	—
Cork	Aug. 7th ...	12 8 0	1 17 0	14 5 0	—	12 0 0	2 14 0	14 14 0	0 11 0	11 3 0	3 14 1	14 17 1	0 3 0
	July 30th ...	14 11 2	0 17 3	15 9 1	—	11 3 3	1 4 0	12 7 3	—	12 0 2	1 3 1	13 3 3	—
	Sept. 27th ...	13 3 1	2 6 2	15 9 3	—	11 8 0	1 14 1	13 2 1	0 16 2	11 14 2	1 15 1	13 9 3	0 3 0
	Sept. 9th ..	8 2 0	1 17 0	9 19 0	0 1 1	9 6 0	1 5 0	10 11 0	0 7 0	8 2 0	1 10 0	9 12 0	0 1 1
	July 23rd ..	12 0 0	1 2 3	13 2 3	—	8 5 3	1 2 3	9 8 2	—	9 2 3	1 2 3	10 5 2	—
Donegal	Aug. 24th ...	14 14 1	1 14 1	16 8 2	0 1 2	14 17 1	1 17 1	16 14 2	0 2 3	14 17 1	2 8 2	17 5 3	0 7 1
	Aug. 12th to 22nd ...	11 2 3	0 17 1	12 0 0	0 4 1	10 5 3	1 1 2	11 7 1	—	13 11 2	1 7 1	14 18 3	0 15 3
Dublin	Aug. 14th ...	9 15 1	2 1 2	11 16 3	—	8 16 1	2 4 2	11 0 3	—	9 15 3	2 5 2	12 1 1	—
	July 19th ...	9 19 0	1 3 1	11 2 1	—	9 3 1	0 17 0	10 0 1	—	10 15 3	1 9 0	12 4 3	—
Galway	June 14th & 21st ...	4 12 2	1 2 2	5 15 0	—	4 2 2	1 5 0	5 7 2	—	4 17 2	0 15 0	5 12 2	—
	Aug. 9th ...	17 13 2	1 12 3	19 16 1	—	14 10 0	1 14 1	16 4 1	—	14 0 0	4 4 1	18 4 1	—
	July 26th ..	5 18 2	2 17 0	8 15 2	—	4 17 0	1 17 0	6 14 0	—	5 7 0	2 14 1	8 1 1	—
Kerry	—	10 15 2	0 13 0	11 8 2	0 0 3	10 17 0	0 11 2	11 8 2	0 0 3	10 8 2	1 3 0	11 11 2	0 0 1
	Oct. 6th to 10th ..	9 9 2	0 14 1	10 3 3	0 0 2	6 6 1	0 15 0	7 1 1	—	7 10 0	0 14 1	8 4 1	—
1	Aug. 26th ...	7 7 1	1 4 0	8 11 1	0 6 2	—	—	—	—	6 3 2	2 4 0	8 7 2	2 1 1
Kildare	Sept. 26th ..	10 13 0	1 6 2	11 19 2	0 12 2	11 8 2	0 16 2	12 5 0	0 18 2	10 15 1	1 12 0	12 7 1	0 15 1
Kilkenny	July 1st ...	8 10 2	0 14 1	9 4 3	—	7 2 0	0 15 0	7 17 0	—	6 7 2	0 19 0	7 6 2	—
	July 1st ...	7 2 0	0 8 2	7 10 2	—	5 5 0	1 1 0	6 6 0	—	5 15 0	0 14 1	6 9 1	—
	July 29th ..	8 1 2	0 10 0	8 11 2	—	11 10 0	0 15 2	12 5 2	—	9 2 2	1 4 1	10 16 3	—
Laoighis	Aug. 10th ...	5 5 0	0 12 0	5 17 0	—	5 1 0	0 11 0	5 12 0	—	5 18 0	0 17 0	6 15 0	—
	Sept. 17th ...	2 12 3	0 11 2	3 4 1	—	2 16 3	0 4 0	3 0 3	—	2 13 1	0 6 0	2 19 1	—
	Oct. 8th ...	6 13 2	1 3 3	7 17 1	—	5 17 1	0 12 1	6 15 2	—	7 2 2	0 13 2	7 15 4	—

Yield of Tubers Per Acre—*Continued*

		Date of Yield Estimate	HOME GUARD				ARRAN PILOT				EPICURE			
			Ware	Small	Ware and Small	Diseased	Ware	Small	Ware and Small	Diseased	Ware	Small	Ware and Small	Diseased
			T. C. Q.	T. C. Q.	T. C. Q.	T. C. Q.	T. C. Q.	T. C. Q.	T. C. Q.	T. C. Q.	T. C. Q.	T. C. Q.	T. C. Q.	T. C. Q.
LIMERICK ...	...	June 27th ...	7 0 0	0 5 0	7 5 0	—	6 15 0	0 5 0	7 0 0	—	6 0 0	0 8 0	6 8 0	—
		Oct. 4th ..	6 4 2	1 3 3	7 8 1	0 19 0	7 2 3	1 2 2	8 5 1	0 18 2	8 5 2	1 4 3	9 10 1	0 16 2
		Nov. 12th .	14 19 1	1 3 1	16 7 2	0 6 3	10 19 2	0 18 3	11 18 1	0 7 2	10 10 0	0 17 2	11 7 2	0 5 1
	2	Sept. 10th	8 3 2	0 11 2	8 15 0	0 8 3	5 3 0	0 5 1	5 8 1	0 12 3	10 15 1	0 17 3	11 13 0	0 8 1
LONGFORD ...	...	July 26th .	13 2 0	1 6 0	14 8 0	0 2 0	11 5 0	1 10 0	12 15 0	0 3 0	10 4 0	1 18 0	12 2 0	0 3 0
		Oct. 29th & Nov. 6th	5 2 0	0 10 0	5 12 0	0 4 1	10 1 1	1 7 0	11 8 1	1 12 3	6 0 0	1 0 0	7 0 0	0 4 1
LOUTH ...	.	Nov. 8th .	11 11 1	0 5 0	11 16 1	0 7 2	6 17 0	0 7 3	7 4 3	0 13 3	9 2 3	0 6 3	9 9 2	0 11 3
MAYO ...	...	Aug. 6th	7 15 0	1 5 0	9 0 0	—	9 0 0	1 10 0	10 10 0	—	7 0 0	1 10 0	8 10 0	—
		Aug. 16th .	10 8 0	1 2 0	11 10 0	—	10 15 0	1 0 0	11 15 0	—	9 8 0	1 4 0	10 12 0	—
MEATH ...	..	Mid-Aug. ...	8 8 3	1 6 2	9 15 1	—	7 14 2	1 2 3	8 17 1	—	8 6 2	1 5 2	9 12 0	—
		Nov. 12th ..	5 7 2	1 11 0	6 18 2	0 9 1	6 14 1	1 1 1	7 15 2	0 10 2	6 17 2	0 18 0	7 15 2	0 9 0
MONAGHAN ...	3	Mid-Oct.	11 8 1	1 18 1	13 6 2	0 15 3	12 19 3	2 4 0	15 3 3	0 18 2	13 7 2	2 11 2	15 19 0	0 15 0
		2nd Week Oct.	10 14 1	0 7 1	11 1 2	0 5 3	10 17 1	0 4 1	11 1 2	1 10 0	11 17 1	0 8 2	12 5 3	0 9 1
OFFALY ...	..	Oct. 4th .	12 2 1	2 5 0	14 7 1	0 8 0	11 18 2	1 17 3	13 16 1	1 18 2	10 19 1	2 14 1	13 13 2	0 1 2
ROSCOMMON ...	...	Sept. 30th	9 3 1	0 11 1	9 14 2	0 6 2	8 3 3	0 15 1	8 19 0	0 16 2	7 16 1	1 2 0	8 18 1	0 8 1
SLIGO ...	...	July 2nd .	11 14 1	0 8 2	12 2 3	—	13 14 1	0 14 0	14 8 1	—	14 5 2	1 0 0	15 5 2	—
		July 8th ..	8 11 2	0 9 1	9 0 3	—	9 8 2	0 8 2	9 17 0	—	8 9 0	0 10 2	8 19 2	—
TIPPERARY N.R.	...	Sept. 9th	10 17 0	1 3 0	12 0 0	1 11 0	13 3 0	1 0 0	14 3 0	1 3 0	9 11 0	1 6 0	10 17 0	2 14 0
		Sept. 27th	9 3 0	1 2 0	10 5 0	1 2 0	9 17 0	1 4 0	11 1 0	1 8 0	7 19 0	1 11 0	9 10 0	1 8 0
TIPPERARY S.R.	...	Aug. 5th .	7 10 0	1 10 0	9 0 0	—	6 0 0	1 0 0	7 0 0	—	6 10 0	1 10 0	8 0 0	—
		Aug. 22nd	11 8 0	2 2 2	13 10 2	1 0 0	9 6 0	2 19 1	12 5 1	1 12 3	10 6 0	2 15 0	13 1 0	0 18 2
WATERFORD ...	...	June 22nd ..	8 10 0	1 10 0	10 0 0	—	9 5 0	1 15 0	11 0 0	—	8 0 0	1 13 0	9 13 0	—
		June 21st ..	9 6 0	2 3 0	11 9 0	—	5 10 0	1 4 0	6 14 0	—	6 10 0	1 4 0	7 14 0	—
WESTMEATH ...	4	Aug. 26th ..	10 18 0	2 10 0	13 8 0	0 6 0	8 15 0	0 18 0	9 13 0	0 0 1	12 4 0	1 2 0	13 6 0	1 6 0
	5	Oct. 11th ..	6 18 1	4 5 3	11 4 0	0 9 1	6 4 0	3 7 2	9 11 2	0 8 2	7 0 2	4 5 0	11 5 2	1 1 1
WEXFORD ...	...	June 7th ..	9 15 0	1 18 0	11 13 0	—	7 3 0	1 15 0	8 18 0	—	7 11 0	1 15 0	9 6 0	—
		June 13th ...	10 17 0	0 17 0	11 14 0	—	11 11 0	1 3 0	12 14 0	—	11 17 0	2 0 0	13 17 0	—
WICKLOW ...	...	Aug. 16th ...	9 12 1	0 4 2	9 16 3	—	9 10 0	0 17 0	10 7 0	—	10 15 3	0 15 1	11 11 0	0 3 3
		Oct. 15th ...	11 15 3	1 14 3	13 10 2	0 1 2	10 17 1	2 5 3	13 3 0	—	11 14 1	3 17 1	15 11 2	—
		July 11th ...	8 3 2	1 2 0	9 5 2	0 10 1	7 3 1	2 1 0	9 4 1	0 5 1	9 1 2	0 10 2	9 12 0	0 1 2
MEAN (58 centres) ...			9 12 3	1 6 2	10 19 1	0 3 3	8 19 3	1 5 1	10 5 0	0 6 1	9 5 3	1 11 1	10 17 0	0 5 3

1. Arran Pilot failed due to Dry Rot of tubers after planting. High proportion of diseased tubers in Epicure due to incidence of Common Scab.
2. Arran Pilot affected by Dry Rot of tubers after planting.
3. There was an appreciable number of blanks in the Home Guard plot.
4. Some blanks in Home Guard plot and still more in that of Arran Pilot.

TRIALS WITH AGROXONE FOR WEED CONTROL.

Trials were conducted in 1946 by the Instructors in Agriculture to test the efficacy of Agroxone—a preparation of a plant hormone—for controlling weeds. A 1% solution of the substance was used on cereal crops at 264 centres. It was applied to wheat at 165 centres, to oats at 109 centres, to barley at 49 centres and to rye at 3 centres. At the majority of the centres, solutions of higher concentration, mainly 2% and 3%, were also tried. The rate of application of solution aimed at was about 100 gallons per statute acre. In all but a few trials the spray was applied in May or June. The weeds were in various stages of growth at the times of spraying but at most centres where charlock was prevalent it was at about the flowering stage. At many of the centres a 3% copper sulphate solution was also used for purposes of comparison.

At a small number of centres the cereal appeared to suffer a slight adverse effect—mainly discoloration and stunting—from the stronger Agroxone sprays, while in a few cases later earing and ripening, possibly due to more rank growth of the cereal. were mentioned. There was, however, no serious injury to wheat, oats or barley which could be attributed to the Agroxone spray, even where 2% or 3% concentration was used. It was reported from a number of centres that the treated cereal made better growth after being sprayed than did the untreated crop. This may have been a result of weed suppression.

The accompanying table shows the number of centres at which the weeds listed were treated and gives an indication of the extent of the control obtained. Very effective control of charlock and other Brassica weeds was obtained with the 1% spray. This appears to be sufficiently concentrated for this purpose as it secured the complete destruction of charlock at 257 out of 262 centres, of wild turnip in 36 out of 41 cases, of wild radish in 5 out of 6 and of pennycress and shepherd's purse at the few centres where their presence was mentioned. Where complete destruction of these Brassica weeds was not secured, either a proportion of the weeds was destroyed, some surviving, or they suffered a general check in development. In only a few cases did they subsequently mature seed and the explanation suggested for these exceptions was that some of the plants were inadequately sprayed or that they were too forward in development when the spray was applied.

Stinging nettles were treated with 1% solution at 33 centres, at 14 of which the weed was completely destroyed overground, at 17 damaged, while at 2 centres it did not appear to be appreciably affected by the spray. The 2% solution gave satisfactory destruction of the overground organs of this weed at a further 18 centres; at 4 it proved more effective than 1% solution, though not giving satisfactory control, and finally at 3 centres it was apparently no more effective than the 1% solution. The indications are that a good wetting of colonies of stinging nettle with 2% spray may be expected to destroy the aerial shoots.

Crowfoot or buttercup (largely creeping crowfoot) was destroyed overground by 1% spray at 44 of the 108 centres where it was prevalent, was unaffected at only 6 and was damaged at the remaining 58. 1% or 2% spray seems worthy of trial where this weed infests cereal crops.

Creeping thistles, docks, lamb's quarter and groundsel (mentioned at only 7 centres) were destroyed overground in a relatively small number of cases and they were damaged at the great majority of centres. Although recovery at different rates and to varying extents took place at many centres, the check in growth of the weeds was considered to have been advantageous to the cereal crop and to have had an appreciable weakening effect on the weeds. This was particularly so in the case of creeping thistle. Corn spurrey, hemp nettle, speedwell and woundwort also suffered an appreciable check in growth at most centres.

Chickweed, corn marigold, redshank, silverweed, dead nettles, sow thistles, sorrels and plantains were unaffected by the 1% spray at about half the centres where they were so treated but were more or less damaged at the remaining centres.

Coltsfoot, knotgrass, bindweeds, poppies, fumitory, mints, wild species of vetch, dandelion and yarrow were unaffected at the majority of the centres where they were present.

Cleavers (goosegrass or robin-run-the-hedge) was unaffected by 1% spray at 38 of 39 centres while couch was not affected at any one of 23 centres.

The results obtained with 2% and 3% sprays suggested that these concentrations may give better control than 1% solution in the case of crowfoot, creeping thistles, docks, lamb's quarter, groundsel, corn spurrey, hemp nettle, chickweed, redshank, silver-weed, dead nettles, sow thistles, sorrels, plantains, coltsfoot and bindweed.

CONCLUSIONS.

These trials show that charlock, wild turnip, wild radish, and pennycress can be satisfactorily destroyed with 1% solution of Agroxone. Although the spray is effective even if not applied until the plants are in flower, destruction of these weeds at an earlier stage of growth would give the crop a greater advantage and is advisable. 2% solution appears to be useful for the destruction of aerial shoots of stinging nettle. Where crowfoot is a troublesome weed in cereal crops, the use of 1% or 2% spray would be likely to assist appreciably in its suppression. Results in the case of other weeds were more indefinite but there are indications that 2% or 3% solution, thoroughly applied, may be of utility in the control of certain species including thistles, docks, lamb's quarter and groundsel. In many cases these and other species, including chickweed, corn spurrey, hemp nettle and dead nettles, while not destroyed, were checked in growth by 1% spray to such an extent that their competition with the cereal was appreciably reduced and seeding prevented.

The spray is not objectionable to handle and, in these trials, both 1%, 2% and 3% concentrations were used on wheat, oats and barley without causing significant injury to the crops. The slight adverse effects produced in a small number of instances would not be a deterrent to use of the spray, whereas 3% copper sulphate solution was frequently found objectionable in this respect and, at the same time, was appreciably less effective than the 1% Agroxone spray for the destruction of charlock and other Brassica weeds, particularly those in an advanced stage of growth.

Agroxone spray is injurious to root crops, potatoes (of certain varieties and in certain circumstances, at least) beans, peas, clovers, flax, etc., and should not, pending further information, be used to control weeds in crops other than cereals. There is risk of injuring clovers undersown, or soon to be undersown, in a cereal crop to which the spray is applied. It is necessary to avoid even wind-drift of spray on to other crops or plants adjacent to cereals which are being sprayed.

When weeds of strong, upright habit of growth, such as docks and lamb's quarter, occur scattered thinly through a cereal crop, their removal by hand and destruction before they commence to form seed may be more economical than the use of a spray. The prevalence of certain weed species is encouraged by the existence of undesirable soil conditions, *e.g.*, acidity in the case of corn marigold and spurrey, and, with a view to the permanent control of such weeds, the correction of the conditions which favour them is advisable.

	1%				2%				3%			
	Presence mentioned No. of Centres	Unaffected	Checked in growth	Overground organs destroyed	No better than 1%	Somewhat better than 1%	Satisfactorily destroyed overground organs	Total No. of Centres	No better than 1%	Somewhat better than 1% or 2%	Satisfactorily destroyed overground organs	Total No. of Centres
Charlock	262	.	5	257	.	5	.	5	.	.	.	.
Wild Turnip	41	.	5	36	.	4	.	4	.	.	.	.
Wild Radish	6	.	1	5	.	.	.	.	.	.	.	.
Pennycress	4	.	.	4	.	.	.	.	.	.	.	.
Shepherd's Purse	2	.	.	2	.	.	.	.	.	.	.	.
Stinging Nettle	33	2	17	14	3	4	13	20	.	3	.	3
Crowfoot	108	6	58	44	5	10	8	23	1	2	.	3
Thistles	166	8	148	10	18	33	15	66	11	5	11	27
Docks	187	15	162	10	20	47	7	74	10	10	6	26
Lamb's Quarter	108	20	78	11	8	9	7	24	2	5	4	11
Groundsel	7	–	5	2	1	1	4	6	1	.	.	1
Corn Spurrey . .	53	15	38	.	3	10	4	17	4	3	3	10
Hempnettle	34	13	20	1	.	5	5	10	.	.	.	.
Speedwells	43	18	25	.	6	2	.	8	2	.	·1	3
Woundwort	18	5	13	.	2	2	1	5	.	1	.	1
Chickweed	176	87	81	8	16	18	11	45	11	7	5	23
Corn Marigold	23	11	12	.	3	1	1	5	3	1	1	5
Redshank	120	57	59	3	13	16	6	35	6	6	5	17
Silverweed	119	56	58	5	10	12	6	28	4	1	5	10
Deadnettles	24	12	12	.	2	7	2	11	.	.	3	3
Sowthistles	32	14	18	.	5	5	2	12	.	1	1	2
Sorrels	45	22	23	.	3	5	2	10	1	1	.	2
Plantains	29	15	11	3	2	3	1	6	.	.	.	.
Coltsfoot	51	37	13	1	.	8	3	11	3	1	.	4
Knotgrass	48	37	9	2	3	1	.	4	2	.	.	2
Bindweed	60	41	19	.	5	4	3	12	2	.	3	5
Poppies	41	24	16	1	1	6	.	7	2	.	2	4
Fumitory	38	23	12	3	3	2	.	5	3	1	.	4
Mints	18	12	6	.	3	.	.	3	.	.	1	1
Wild Vetches	11	7	1	3	.	.	.	.	.	.	.	.
Dandelion	10	7	3	.	1	.	1	2	.	.	.	.
Yarrow	8	5	3	.	.	.	1	1	.	.	.	.
Cleavers	39	33	6	.	2	.	.	2	3	1	.	4
Couch	23	23	.	.	.	.	.	.	.	.	.	.

REPORT OF THE SEED PROPAGATION DIVISION, 1946

As in previous years the bulk of the barley propagations and other investigational work was carried out at the Cereal Station, Ballinacurra, Co. Cork, in close collaboration with Messrs. A. Guinness, Son and Co., Ltd., at whose Experimental Maltings the malting tests were conducted. The work consisted of the usual pure line propagations, large-scale variety, half-drill strip and other experiments.

Pure line propagations of Red Marvel and April Red Bearded wheats and Black Tartary oats were maintained at the Cereal Station and extension plots of April Red Bearded wheat, Victory II, and Glasnevin Triumph oats were grown in the neighbourhood of Ballinacurra.

WEATHER CONDITIONS, 1946.

The year 1946 was particularly sunless. The weather during the first six weeks of the year was wet and broken and resulted in extensive flooding of low-lying and tidal areas. The second half of February was very dry and there was much brilliant sunshine by day and ground frost at night. The first three weeks of March were cold and wet, but after this, dry weather set in and continued till mid-May. By this time, harsh, dry winds had caused a drought. The weather broke at the end of May and continued very unsettled with frequent showers, alternating with brilliant sun throughout June. There was warm, sunny weather during the first half of July but conditions during the remainder of the month were unsettled. Saving of hay was very troublesome.

During August there was much heavy rain and strong gales, resulting in lodging and tossing of corn. The average temperature for the month was the lowest recorded for 84 years. September was exceptionally rainy, there being only five rainless days in the month. Harvesting of cereals was most difficult. In the second week of October, a harsh, dry, easterly wind set in, during which time threshing was done. This improvement in the weather did not last long. Throughout November and December, the weather remained windy and unsettled. From the beginning of August to the end of December, the rainfall was 23.8", *i.e.*, over 6" more than the average for that period. The number of hours sunshine for that period was 105 below average.

BARLEY.

The method adopted in 1929 in the selection of Spratt-Archer 37 No. 3 was again adopted in the selection of Spratt-Archer 37 No. 3 and Spratt-Archer

37 No. 4. This method consists of sowing five grains from every fifth plant of a single line in the preceding year. The pure line is thus composed of twenty-five five-grain lines. Each of the other varieties was propagated by taking the requisite amount of seed from the single line grown in 1945.

In addition to the pure lines mentioned above, forty-six single plant selections were grown in the Old Cage at the Cereal Station, Ballinacurra. These were as follows:—

Spratt-Archer 37/6, Spratt-Archer 37/6 No. 7, Spratt-Archer 37 No. 4 (single line of 25 five grain lines), Spratt-Archer 37/6/3, Spratt-Archer ex-Albert Agricultural College, Archer Goldthorpe 4/5/1, Spratt-Archer, Goldthorpe, Old Irish, Burton Malting, Victory, D.S.K. Binder, Plumage Archer, Plumage, Hybrid No. 7, Hybrid No. 5 (Spratt x Archer), Black Himalayan, Abed Kenia, Kenia, Goldthorpe Kenia 13/4, Naked Barley, Golden Archer 1, Golden Archer 2, Gold, Goldberg, Goldberg 2, Glabron, Pearl, Donegal Six-Rowed, July Six-Rowed, Beaven's F.112, Beaven's 49/14/3, B.244, Spratt-Archer 37 No. 3 H.9 x Golden-Archer 2 No. $\frac{1}{1}$, Spratt-Archer 37 No. 3 H.9 x Golden Archer 2 No. $\frac{1}{2}$, Spratt-Archer 37 No. 3 H.9 x Golden Archer 2 No. 2, Spratt-Archer 37/9 x Golden Archer 2 No. 1, Spratt-Archer 37/9 x Golden Archer 2 No. 2, Maja, Beaven's 54/12/3, Camton, Pioneer (Winter), Wong (Six-Rowed Winter), Hordeum Deficiens No. 16, Hordeum Deficiens No. 16 x Irish Archer.

Garden, Field and First Pedigree plots as follows were grown on the farm of John H. Bennett, Ltd., Ballinacurra :—

GARDEN PLOTS.

Spratt-Archer 37 No. 3 (25 plots for experimental purposes).
Spratt-Archer 37 No. 3 (25 lines).
Spratt-Archer 37/6/3.
Spratt-Archer 37 No. 3 H.9 x Golden Archer 2 No. $\frac{1}{1}$.
Spratt-Archer 37 No. 3 H.9 x Golden Archer 2 No. $\frac{1}{2}$.
Spratt-Archer 37 No. 3 H.9 x Golden Archer 2 No. 2.
Spratt-Archer 37/9 x Golden Archer 2 No. 1.
Spratt-Archer 37/9 x Golden Archer 2 No. 2.
Goldthorpe Kenia 13/4.
Plumage Archer.
Hybrid No. 7.
Hybrid No. 5 (Spratt x Archer).
Camton.
Abed Kenia.
D.S.K. Binder.
Donegal Six-Rowed.
July Six-Rowed.
Hordeum Deficiens No. 16.
Hordeum Deficiens No. 16 x Irish Archer.

FIELD PLOTS.

Spratt-Archer 37 No. 3.
Spratt-Archer 37/6/3.
Spratt-Archer 37/9 x Golden Archer 2 No. 1.
Spratt-Archer 37/9 x Golden Archer 2 No. 2.
Plumage Archer.
Kenia x Maja ex Albert Agricultural College.
Kenia x Spratt-Archer Kenia 6/3 No. 1 ex Albert Agricultural College.
Kenia x Spratt-Archer Kenia 6/3 No. 3 ex Albert Agricultural College.
Abed Kenia.
Camton.
Hybrid No. 5 (Spratt x Archer).
Hybrid No. 7.
D.S.K. Binder.

FIRST PEDIGREE PLOTS

Spratt-Archer 37 No. 3	4 acres.
Spratt-Archer 37 No. 3 H.9 x Golden Archer 2 No. ½ ..	1 acre.
Spratt-Archer 37/9 x Golden Archer 2 No. 1	1 ,,
Spratt-Archer 37/9 x Golden Archer 2 No. 2	1 ,,
Beaven's 54/12/3	1 ,,
D.S.K. Binder	1 ,,

The produce of these plots will be available in 1947 for further propagation and Large Scale Variety Experiments.

Second Pedigree plots of Spratt-Archer 37 No. 3 were grown under contract with the following farmers in the neighbourhood of Ballinacurra.

	brls.	sts.
R. Barry, Broomfield, Midleton	4	8
J. Tait, Inch, Glebe, Whitegate	10	8
M. Kelleher, Geragh, Ballinacurra	4	8
J. Hegarty, Ballinbeg, Rostellan	5	0
J. O'Reilly, Ballinabointra, Carrigtwohill	3	8
R. Scanlon, Geragh, Ballinacurra	3	0
	31	0

The produce of these plots will be available for distribution as nucleus stocks of pedigree seed in the spring of 1947.

For a number of years the Department has had in operation a scheme under which nucleus stocks of Pedigree Spratt-Archer barley are distributed each year to members of the Irish Maltsters' Association and others interested in

seed barley distribution. Those who obtain such stocks undertake to have them grown with reliable farmers; to buy the produce if suitable for seed purposes, and distribute it to growers in the following season. Under this Scheme 313 barrels of Spratt-Archer 37 No. 3 were distributed to the following :—

		brls.
Messrs.	Minch, Norton & Co. Ltd., Athy	55
,,	,, ,, ,, ,, Nenagh	16
,,	,, ,, ,, ,, Bagenalstown ..	10
,,	,, ,, ,, ,, Barracore	10
,,	,, ,, ,, ,, Stradbally	14
,,	P. O'Meara & Sons, Ltd., Thurles	10
,,	N. Hardy & Co., Ltd., 72, Park St., Dundalk ..	10
,,	Cairnes, Ltd., Drogheda	10
,,	J. Bolger & Co., Ltd., Ferns, Co. Wexford ..	10
,,	Birr Maltings, Ltd., Birr	8
,,	Beamish & Crawford, Ltd., Cork	5
,,	F. A. Waller & Co., Ltd., Banagher	9
,,	Geo. Read & Co., Ltd., Roscrea	10
,,	Joshua Watson & Co., Ltd., Carlow	30
,,	Joshua Watson & Co., Ltd., Leighlinbridge ..	10
,,	W. J. O'Keefe & Son, Wexford	8
,,	D. E. Williams, Ltd., Tullamore	25
,,	P. & H. Egan, Ltd., Tullamore	14
,,	J. & A. Tarleton, Ltd., Tullamore	8
,,	R. Gibney & Co., Ltd., Portlaoighise	8
,,	The North Tipperary Maltings, Ltd., Nenagh ..	9
,,	R. Perry & Son, Ltd, Rathdowney	10
,,	J. H. Bennett, Ltd., Ballinacurra	10
Mr.	A. J. M. Reeves, Athgarvan Maltings, Co. Kildare ..	4
		313

In addition to the above the following quantity of seed barley was also distributed :—

D.S.K. Binder.

To the Agricultural School, Athenry, Co. Galway, 8 brls. 5 sts.

INSPECTION OF GROWING CROPS FOR SEED PURPOSES.

In order that those who co-operate in the scheme for the distribution of Pedigree Spratt-Archer seed might have information regarding the suitability of the produce for seed purposes, the Department arranged to have the crops

which were grown for this purpose inspected by the Agricultural Instructors before harvest. For inspection purposes the crops were divided into three classes :—(1) Crops grown from seed which was obtained from Ballinacurra in 1946 ; (2) Crops grown from seed which was the produce of seed obtained from Ballinacurra in 1945 and (3) Crops grown from Commercial seed of Spratt-Archer 37 No. 3. As regards (3) inspections were only made in those cases where the maltsters concerned were of opinion that they would not have sufficient seed otherwise and so required inspections made of the most promising crops grown from Commercial stocks.

A total of 5,509 statute acres was inspected, of which 4,896 acres were reported as likely to produce grain suitable for seed purposes if properly harvested. Of the 456 acres inspected under category (1) 15 acres or 3.3% were rejected because of an undue proportion of wheat, oats or noxious weeds.

In category (2) 3,343 acres were inspected and 421 acres or 12.6% were rejected. The rejections were chiefly due to other barleys having been sown in the same field, smut and the presence of an undue amount of oats and wheat. Under category (3) 1,710 acres were inspected and 177 acres or 10.4% were rejected for the same causes as in category (2).

From the number of crops rejected it is apparent that some distributors did not take sufficient care in the selection of growers and in having the seed properly treated with a fungicidal dressing before it was despatched to growers. It is desirable that firms co-operating in this scheme should exercise care in selecting growers and in treating the seed with a suitable powder dressing before it is despatched to them.

LARGE SCALE BARLEY VARIETY EXPERIMENTS.

These experiments were carried out at ten centres in seven counties, one in each of Counties Cork, Tipperary, Kilkenny, Kildare and Louth, two in Offaly and three in Wexford. The seed used for the experiments was the produce of the first Pedigree plots established at the Cereal Station, Ballinacurra, Co. Cork, in 1945. The area of the plots throughout was one statute acre. All the seed was dressed with Agrosan powder at the rate of 8 ozs. per barrel of seed. The four varieties sown at all centres were Spratt-Archer 37 No. 3, Spratt-Archer 37/9 x Golden Archer 2 No. 1, Beaven's 54/12/3 and Spratt-Archer 37 No. 3 H.9 x Golden Archer 2 No. 2.

Sowing conditions were favourable and all plots were sown by the 17th April.

At all centres the seed germinated well and at the end of May there was a good braird on all plots. Subsequent progress was unusually good but the

very adverse weather towards the end of the growing season and during ripening and harvesting nullified the early promise and resulted in quality well below the usual standard. Early lodging occurred in all plots at the Kilkenny centre and in the Spratt-Archer 37 No. 3 plot at the Ballygrangans, Co. Wexford, centre. These early lodged plots were in very bad condition at harvest. A very severe attack of "Take all" was responsible for the almost complete failure of the Birr plots. At the Nenagh centre it was found impossible to harvest the plots as an experiment owing to bad weather.

The names and addresses of the growers, the nature of the soil and subsoil, the crops grown in the two previous years and the dates of sowing and harvesting are set out in Table 1.

In Table II, the weights of grain per statute acre, the commercial value of the grain as determined by independent valuers, and the total value of the grain including screenings which were valued at 6d. per stone, are set out. The values thus determined are not those which would have been obtained in the season 1946, during which the price of barley was fixed at 35/- per barrel but they were based on an arbitrary price range closely related to the fixed price.

Spratt-Archer 37 No. 3 H.9 x Golden Archer 2 No. 2, yielding 13 stones per acre less than the standard, Spratt-Archer 37 No. 3, seems to have nothing to recommend it.

Last year in this experiment Beaven's 54/12/3 was comparable with the standard in every feature except bushel weight, for which it had a significantly lower figure. Its lower bushel weight was reflected in lower value per barrel. In the comparison this year it retains the latter feature and offsets a better figure for nitrogen by a lower yield. On the whole it does not promise to be as good an all-round barley as the standard.

Spratt-Archer 37/9 x Golden Archer 2 No. 1 gave half a barrel more grain per acre than the standard. In appearance in the field and in grain analysis the two varieties are very much alike.

TABLE I.

LARGE SCALE BARLEY VARIETY EXPERIMENTS, 1946.

Centre No.	Name and Address of Grower.	Description of Soil.	Previous Crops	Date of Sowing	Date of Harvesting
1	Wm. Tait, Rostellan, Co. Cork ..	Medium Loam Sub-soil, Shale	1944 Beet 1945 Wheat	1st Apr.	31st Aug.
2	P. Byrne, Ballygrangans, Wexford	Sandy Loam Sub-soil, Gravel	1944 Barley 1945 Beet	4th Apr.	24th Aug.
3	D. Morris, Tomahurra, Enniscorthy	Shale Loam Sub-soil, Shale	1944 Barley 1945 Roots	3rd Apr.	10th Sept.
4	Mrs. Segrave, Dunany, Dunleer ..	Strong Loam Sub-soil, Gravel	1944 Wheat 1945 Swedes	8th Apr.	9th Sept.
5	M. Howlett, Ramsgrange, Wexford	Stiff Loam Sub-soil, Shale	1944 Wheat 1945 Roots	11th Apr.	14th Sept.
6	M. P. Minch, Rockfield, Athy ..	Deep Loam Sub-soil, Gravel	1944 Barley 1945 Beet	25th March	21st Aug.
7	W. Mullins, Duninga House, Goresbridge	Strong Loam Sub-soil, Gravel and Limestone	1944 Barley 1945 Peas	17th Apr.	2nd Sept.
8	D. O'Brien, Ballinamere, Tullamore	Gravelly Loam Sub-soil, Limestone	1944 Grass 1945 Oats	8th Apr.	4th Sept.
9	E. P. Ruttledge, Ballyeighan, Birr	Light Loam Sub-soil, Limestone	1944 Swedes 1945 Wheat	9th Apr.	10th Sept.
10	M. Carroll, Belleen, Nenagh ..	Strong Loam Sub-soil, Limestone	1944 Barley 1945 Swedes	10th Apr.	7th Sept.

TABLE II.

Large Scale Barley Variety Experiment, 1946. Yield and Value of Grain per Statute Acres.

	Spratt Archer 37 No. 3				Spratt Archer 37/9 x Golden Archer 2 No. 1				Spratt Archer 37 No. 3 H 9 x Golden Archer 2 No. 2				Beaven's 54/12/3.			
	Yield of Dressed Grain	Screen-ings	Value per Barrel	*Total Value including Screenings	Yield of Dressed Grain	Screen-ings	Value per Barrel	*Total Value including Screenings	Yield of Dressed Grain	Screen-ings	Value per Barrel	*Total Value including Screenings	Yield of Dressed Grain	Screen-ings	Value per Barrel	*Total Value including Screenings
	brls. sts.	sts.	s. d.	£ s. d.	brls. sts.	sts.	s. d.	£ s. d.	brls sts	sts	s. d.	£ s. d.	brls sts	sts	s. d.	£ s. d.
Cork																
W. Tait ...	12 12	1	35 5¼	22 12 7	11 14	1	35 4½	21 0 7	11 11	1	35 2½	20 12 0	12 0	1	35 3¾	21 4 0
Offaly																
E. P. Ruttledge ..	4 9	4	34 2¾	7 18 1	4 15	8 5	34 4	8 13 9	4 8	4	34 1½	7 15 7	4 14	7	34 7	8 12 1
D. O'Brien ..	10 8	2.5	35 3¾	18 11 10	11 7	3	35 4½	20 6 1	8 6	3	35 3½	14 17 1	9 10	2.5	35 0	16 18 1
Kildare																
M. P. Minch ...	16 1	1.5	35 7	28 12 4	16 13	1.5	35 9	30 1 9	15 3	2	35 6	27 0 2	16 2	1.5	35 6½	28 13 10
Kilkenny																
W. Mullins	10 6	7	35 8	18 13 6	10 6	3.5	35 6¼	18 10 6	10 7	3.5	35 4	18 10 6	9 13	4 5	35 2	17 7 4
Wexford																
M. Howlett ...	11 11	7	35 2¼	20 15 0	11 1	7.5	35 3¼	19 14 2	10 15	4 5	35 3	19 7 9	9 2	4.5	35 2	16 3 2
P. Byrne	9 5	4.5	35 5¼	16 12 5	11 15	5.0	35 10	21 10 3	9 13	4	35 8¼	17 12 5	12 1	3.5	35 9¼	21 13 6
D. Morris	12 6	1	35 10	22 3 11	11 3	1	35 9	20 0 6	10 1	1	35 8	17 19 5	10 10	1	35 6¾	18 17 8
Louth																
Mrs. Segrave ...	12 13	6	35 11	23 3 2	15 5	2.5	35 10½	27 10 7	12 5	1 5	35 8¼	22 0 5	13 2	2.5	35 7½	23 8 10
TOTAL ...	100 7	34.5		179 2 10	104 15	33.5	—	187 8 2	93 5	24.5	—	165 15 4	97 6	28	—	172 18 6
AVERAGE ...	11 2.6	3.8	35 5	19 18 1	11 10.6	3.7	35 5¼	20 16 6	10 5.9	2 7	35 4	18 8 4	10 13.1	3.1	35 3¾	19 4 3

*Screenings valued at 6d per stone

TABLE III.

Large Scale Barley Variety Experiments, 1946. Analysis of Produce.

GROWER	Spratt Archer 37 No 3				Spratt Archer 37 9 x Golden Archer 2 No. 1				Spratt Archer 37 No 3 H.9 x Golden Archer 2 No 2				Beaven's 54/12/3			
			On Dry Matter				On Dry Matter				On Dry Matter				On Dry Matter	
	Bushel Weight	Moisture	Weight of 1,000 Corns	Nitrogen	Bushel Weight	Moisture	Weight of 1,000 Corns	Nitrogen	Bushel Weight	Moisture	Weight of 1,000 Corns	Nitrogen	Bushel Weight	Moisture	Weight of 1,000 Corns	Nitrogen
	lb.	%	grms.	%	lb.	%	grms.	%	lb.	%	grms.	%	lb.	%	grms.	%
Wm. Tait	47.8	24.3	29.0	1.48	48.3	24.2	29.4	1.44	47.8	21.3	30.0	1.56	46.8	24.4	30.6	1.42
E. P. Ruttledge ..	43.9	23.2	25.4	1.54	42.9	26.4	27.8	1.49	44.8	20.0	28.0	1.64	43.2	21.6	28.8	1.45
D. O Brien	47.1	23.0	29.8	1.36	46.9	25.2	30.5	1.46	47.7	22.2	32.4	1.48	45.6	23.0	31.2	1.36
M P Minch	50.8	22.5	33.1	1.46	51.5	21.6	31.3	1.54	51.0	22.0	34.5	1.56	50.9	21.6	33.6	1.46
W. Mullins	49.3	25.5	33.7	1.34	48.2	26.2	32.8	1.38	47.5	26.4	33.3	1.53	45.7	26.1	31.0	1.40
M. Howlett	48.5	22.9	31.6	1.52	47.4	23.9	30.6	1.56	48.6	23.9	32.2	1.52	46.2	23.4	29.4	1.28
P. Byrne	50.7	18.4	28.7	1.56	51.6	21.9	32.8	1.26	51.2	22.0	33.2	1.36	50.3	21.5	33.5	1.23
D. Morris ..	49.2	24.2	32.3	1.33	49.2	22.5	31.4	1.32	48.2	24.3	32.6	1.36	47.6	24.3	33.8	1.25
Mrs. Segrave	52.8	21.7	35.2	1.26	53.2	21.2	36.6	1.31	53.0	20.8	33.7	1.40	51.4	21.8	38.5	1.24
AVERAGE ..	48.90	22.86	31.01	1.428	48.80	23.68	31.80	1.418	48.87	22.88	32.77	1.490	47.52	23.08	32.27	1.343

HALF DRILL STRIP EXPERIMENTS.

Three of these experiments were carried out on the farm of Messrs. J. H. Bennett, Ltd. Each trial consisted of twenty-two strips of each variety under test, a strip being half the width of the corn drill. To ensure even sowing, the seed in each half of the corn drill was changed over for the sowing of the second half of the experiment. In order to maintain the sequence of the strips, the machine was driven up the field idle before commencing to sow the second half of the experiment.

In No. 1 experiment the produce of the 1945 field plot of Spratt-Archer 37 No. 3 was tested against the second pedigree plot of the same variety, the object being to ascertain if the younger generation was maintaining the desirable qualities of the older generation.

In No. 2 experiment Spratt-Archer 37 No. 3 was tested against Spratt-Archer 37/9 x Golden Archer 2 No. 2.

In No. 3 experiment Spratt-Archer 37 No. 3 ex Cereal Station was tested against the same variety ex Albert Agricultural College, Glasnevin. These stocks differed only in that the former has been propagated continuously at Ballinacurra during the past 25 years or so, while the latter had been propagated at Glasnevin over a similar period.

The results, which are set out in Table IV, show that there was no significant difference between the varieties tested in any of these experiments.

TABLE IV.

HALF DRILL STRIP EXPERIMENTS, 1946.

	No. 1 Expt.						No. 2 Expt.						No. 3 Expt.					
	Field Plot			2nd Pedigree			Spratt Archer 37 No. 3			S.A. 37.9 x G.A. 2 No. 2			S.A. 37 No. 3 ex Cereal Station			S.A. 37 No. 3 ex Glasnevin		
		sts.	lb.		sts.	lb.		sts.	lb.		sts.	lb.		sts.	lb.		sts.	lb.
	a.	3	6½	B.	4	0	a.	3	12	B.	4	1	a.	2	12	B.	2	13
	C.	4	3	b.	3	9	C.	3	11	b.	4	1	C.	3	8	b.	2	12
	c.	4	1½	D.	4	3	c.	3	11½	D.	3	12	c.	3	7	D.	3	8
	E.	3	13½	d.	4	3	E.	4	2	d.	4	3	E.	3	12	d.	3	12
	e.	4	3	F.	3	12	e.	4	0½	F.	4	1	e.	3	12	F.	3	12
	G.	4	1½	f.	3	13	G.	4	4½	f.	4	0½	G.	3	10	f.	3	11
	g.	4	0	H	3	13	g.	4	2	H.	3	13	g.	3	10	H.	2	1
	I.	3	11	h.	4	0	I.	3	12	h.	4	1	I.	3	10	h.	3	12
	i.	3	13½	J.	4	2	i.	3	8	J.	4	2	i.	3	10	J.	3	9
	K.	4	2	j.	3	12½	K.	4	4	j.	4	2	K.	3	7	j.	3	6
	k.	4	1	L.	4	0½	k.	4	0½	L.	4	2	k.	3	10	L.	3	6
	M.	4	0	l.	3	12	M.	3	12½	l.	4	3½	M.	3	0	l.	2	13
	m.	4	0½	N.	4	0	m.	4	1	N.	4	0½	m.	3	6	N.	3	5
	P.	4	3½	n.	3	13	P.	4	1	n.	4	0½	P.	3	8	n.	3	9
	p.	4	1	Q.	4	6	p.	3	10	Q.	3	11	p.	3	7	Q.	3	3
	R.	4	2½	q.	4	1	R.	3	10½	q.	3	11	R.	2	12	q.	2	13
	r.	4	5	S.	4	1	r.	3	12½	S.	4	0	r.	3	10	S.	3	9
	T.	4	0	s.	3	13	T.	4	4	s.	4	0½	T.	3	9	s.	3	12
	t.	3	6	V.	4	4	t.	4	0½	V.	4	11	t.	4	2	V.	4	0
	W.	4	1	v.	3	13	W.	4	1	v.	4	0	W.	3	11	v.	4	0
	w.	4	3	X.	4	3	w.	4	0½	X.	3	13½	w.	4	2	X.	4	7
	Y.	3	13	x.	4	0	Y.	3	13	x.	3	11	Y.	4	6	x.	4	2
Total ..		88	8		88	8		87	8½		89	3		79	13		77	7
Average (lb.) ..	56.4			56.4			55.7			56.8			50.9			49.1		
Average Moisture %	19.6			19.7			19.9			19.6			19.0			19.0		
*Average Nitrogen %	1.40			1.34			1.26			1.27			1.20			1.20		
Average weight of 1,000 corns (grms.)	35.4			34.6			34.8			35.9			34.8			34.2		
Relative Malting Quality	100.0			100.7			100.0			100.5			100.0			99.8		

SMALL SCALE QUANTITATIVE EXPERIMENTS, 1946.

There were nine of these experiments. Experiments Nos. 1, 2 and 3 were of the usual chessboard type, the seed being dibbled in at regular intervals. Eight varieties or selections were tested in each trial. There were fifteen plots of each variety and the layout was in the form of randomised blocks. Experiments Nos. 4 to 9, inclusive, were sown with a Planet Junior seeder. The area of each plot was 10 square yards and the layout was a series of randomised blocks with 5 replications, or in other words there were six plots of each variety in each experiment.

The varieties tested in these experiments together with the results are given in Tables V and VI.

Experiment No. 1 was sown in the Old Cage. Experiment No. 2—a replica of Experiment No. 1—was sown in the adjoining field. This was done in order to test the dependability of the results of experiments conducted in the cages. For a number of years past the yields obtained from experiments conducted in the cages have been abnormally low and there was some doubt as to the reliability of the results.

The yields from the experiment conducted outside the cage were approximately twice as high as those from the experiment inside the cage. Spratt-Archer x Archer No. 20 yielded significantly best in both experiments. This selection also shows promise of excellent malting quality. With the exception of Spratt x Archer No. 19, the order of merit of the other varieties and selections in respect of yield differed as between the two experiments. None of these varieties, however, differed significantly in yield from the general mean.

In Experiment No. 3 all the new selections gave a better yield than the standard variety. Spratt Archer x Kenia No. 17 gave the highest yield and had the lowest nitrogen but this selection did not malt so well as might be expected from its analysis.

In Experiments Nos. 4 to 9 inclusive none of the new hybrids tested gave promising results.

TABLE V

SMALL SCALE QUANTITATIVE EXPERIMENTS, 1946: AVERAGE OF FIFTEEN PLOTS

Experiment	Variety	No. of Plants	No. of Ears	Ear weight	Straw weight	Grain weight	Co-efficient	*Nitrogen	Weight of 1,000 corns	Relative Malting Quality
				grms	grms.	grms.	%	%	grms.	
1.	S.A. x Archer No. 20	94.0	177.3	204.1	196.6	167.9	42.0	1.41	36.2	100.2
	Spratt x Archer No. 19	93.4	182.9	201.2	206.5	163.9	40.3	1.39	36.4	98.9
	S.A. x Spratt No. 2	92.3	183.7	193.4	197.2	159.9	40.9	1.36	35.8	99.8
	S.A. x Archer No. 17	90.7	174.4	191.4	198.7	159.3	40.9	1.42	35.4	98.8
	Spratt x Archer No. 30	94.4	180.9	186.1	209.7	151.8	38.3	1.45	36.9	97.7
	S.A. 37/6/3	93.2	183.5	180.9	186.0	148.4	40.6	1.34	34.1	100.0
	S.A. 37 No. 3	90.6	178.6	178.3	182.9	145.9	40.4	1.36	34.0	100.0
	S.A. 37 No. 3 ex Albert College	93.1	180.5	176.9	175.3	144.8	41.1	1.33	34.4	99.7
2.	S.A. x Archer No. 20	97.3	327.9	368.3	489.1	308.7	36.0	1.40	35.6	100.5
	Spratt x Archer No. 19	95.1	326.6	339.0	471.6	281.4	34.6	1.39	34.4	97.9
	S.A. x Archer No 17	97.5	312.9	330.5	447.2	278.2	35.9	1.37	35.6	—
	S.A. 37 No. 3	93.7	328.1	327.0	446.2	275.6	35.7	1.44	33.7	100.0
	S.A. 37 No. 3 ex Albert College	93.9	332.3	328.8	445.4	273.1	35.7	1.36	33.4	100.1
	S.A. x Spratt No. 2	97.0	332.3	327.9	440.4	274.9	35.9	1.34	34.4	100.1
	S.A. 37/6/3	93.3	334.1	323.7	439.6	272.6	35.9	1.41	33.8	101.2
	Spratt x Archer No. 30	97.5	322.9	327.0	500.5	270.8	32.8	1.50	36.6	96.4
3	S.A. x Kenia No. 17	93.3	376.7	416.0	482.0	352.6	39.3	1.26	39.4	98.8
	,, x ,, No. 6	93.7	326.5	385.1	503.1	332.9	37.6	1.40	40.0	97.8
	,, x ,, No. 15	89.8	345.8	375.0	395.1	331.3	43.1	1.35	36.7	91.3
	Kenia	91.7	350.6	374.7	479.0	327.8	38.6	1.44	39.1	94.7
	S.A. x Kenia No. 18	95.3	350.2	386.3	603.8	327.8	33.2	1.41	38.2	95.8
	,, x ,, No. 7	96.3	363.1	368.6	458.9	311.8	37.9	1.35	32.5	96.8
	,, x ,, No. 1	94.1	349.9	371.0	570.5	311.6	33.1	1.39	36.4	99.4
	S.A. 37 No. 3	88.9	323.5	361.9	696.2	301.9	28.5	1.29	37.6	100.0

S.A. = Spratt Archer. *On Dry Matter

TABLE VI.

SMALL SCALE QUANTITATIVE EXPERIMENTS, 1946 : AVERAGE OF SIX PLOTS.

Experiment No.	VARIETY	Grain Yield ozs.	*Nitrogen %	Weight of 1,000 corns grms.
4.	Kenia	123.7	1.66	39.3
	Spratt Archer x Kenia No. 13 ..	118.8	1.55	37.2
	,, ,, x ,, No. 12 ..	118.5	1.56	37.2
	,, ,, x ,, No. 2 ..	113.5	1.58	39.6
	,, ,, x ,, No. 9 ..	113.5	1.54	39.0
	,, ,, x ,, No. 5 ..	112.7	1.49	37.0
	,, ,, x ,, No. 3 ..	108.8	1.55	37.2
	Spratt Archer 37 No. 3	105.7	1.56	33.8
5.	Spratt Archer x Kenia No. 22 ..	100.8	1.54	39.5
	Spratt Archer 37 No. 3	100.8	1.47	35.1
	Kenia	100.7	1.64	40.0
	Spratt Archer x Kenia No. 16 ..	100.7	1.51	37.8
	,, ,, x ,, No. 21 ..	100.5	1.66	37.4
	,, ,, x ,, No. 14 ..	98.3	1.54	36.2
	,, ,, x ,, No. 23 ..	97.8	1.58	41.1
	Spratt Archer x Spratt No. 9 ..	94.7	1.65	33.4
6.	Spratt Archer 37 No. 3	74.7	1.43	34.0
	Spratt x Archer No. 10	72.5	1.56	34.6
	,, x ,, No. 40	69.5	1.50	37.5
	,, x ,, No. 27	68.3	1.53	34.0
	,, x ,, No. 29	66.8	1.60	35.7
	,, x ,, No. 67	65.1	1.46	35.2
	,, x ,, No. 5	64.5	1.52	32.9
	,, x ,, No. 30	60.7	1.54	38.4
7.	Spratt Archer 37 No. 3	68.8	1.42	33.2
	Spratt x Archer No. 50	67.5	1.54	36.6
	,, x ,, No. 45	66.5	1.58	34.8
	,, x ,, No. 7	64.1	1.58	37.4
	,, x ,, No. 63	63.3	1.46	37.0
	,, x ,, No. 42	60.8	1.66	34.8
	,, x ,, No. 46	60.8	1.58	35.7
	,, x ,, No. 13	54.5	1.49	36.1
8.	Spratt Archer x Archer No. 14 ..	74.0	1.44	36.0
	Spratt Archer 37 No. 3	71.1	1.44	33.5
	Spratt Archer x Archer No. 9 ..	69.5	1.42	36.1
	,, ,, x ,, No. 3 ..	69.1	1.45	37.3
	,, ,, x ,, No. 13 ..	67.1	1.46	35.1
	,, ,, x ,, No. 8 ..	65.8	1.51	36.4
	,, ,, x ,, No. 5 ..	64.0	1.44	36.5
	,, ,, x ,, No. 11 ..	63.5	1.53	32.3
9.	Spratt Archer x Archer No. 19 ..	75.5	1.43	35.6
	,, ,, x ,, No. 16 ..	74.7	1.52	36.2
	,, ,, x ,, No. 12 ..	73.5	1.42	35.5
	,, ,, x ,, No. 1 ..	73.5	1.36	35.2
	,, ,, x ,, No. 10 ..	72.5	1.48	34.0
	Spratt Archer 37 No. 3	72.3	1.36	33.8
	Spratt Archer x Archer No. 6 ..	71.3	1.43	34.0
	,, ,, x ,, No. 15 ..	60.7	1.49	33.8

*On dry matter.

ÉIRE

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CONTENTS

SEAWEED AS A FOOD FOR FARM STOCK

By

PROFESSOR E. J. SHEEHY, D.Sc., University College, Dublin.

While seaweed is grazed by farm stock along the sea shore in parts of the world, *viz.*, New Zealand, Lapland, Faroe and Orkney Islands, Norway, etc., its preparation as a commercial product for the purpose of providing food for farm stock has not reached large dimensions. In the dried, ground condition it is, however, on the market, and the value of this material as an ingredient of diet is a matter of interest to feeders of stock. Different genera and species of seaweed differ from one another in feeding value, and, in the case of certain species at any rate, the feeding value varies with the time of year the sample is collected. Accordingly, ground seaweed is by no means a constant product, the species of which it is composed, to a lesser extent the time of collection, and possibly also the locality from which the collection is made affecting the amount of nutriment in a sample.

Data is available from a number of experimental centres concerning the composition, digestibility and feeding value of seaweed, and two publications (1) (2) from this College deal with experimental work on seaweed collected round the Irish coast, dried, ground, and fed in digestion crates to pigs and sheep. The reader is referred to those two publications for a list of other published works on seaweed and for details of composition, digestibility, etc., of the different genera and species of seaweed examined. This article presents in a general way and in a form which is intelligible to feeders the results of recorded experimental work, particularly of that conducted in this country, and it includes, in addition, the results of group feeding experiments recently conducted at this College, using pigs, cattle and poultry as experimental animals.

The discussion refers to the two genera of seaweed, namely laminaria and fucus, which grow freely round our shores and on which most of the feeding experiments recorded have been done. Laminaria, commonly known as drift weed or May weed and consisting of long fronds or leaves attached to stalks, grows in shallow water below the low water mark. Rough weather dislodges a considerable quantity of this weed which is washed up on the beach, and in early summer the fronds or leaves break off naturally and are washed ashore around our coast, particularly in the south-west, west, and north-west. The fucus type of seaweed, commonly referred to as wrack or bladder wrack, grows on rocks and stones between high and low water marks. The experiments done at this College were conducted on laminaria collected on the west coast of Ireland and on fucus collected some on the west and some on the east coast. In the case of the collected samples of laminaria, as in the commercial preparation of the Irish seaweed meal (dried ground seaweed), only the fronds of the weed were used.

The chemical composition of samples of seaweed varies with the variety, stage of growth and time of cutting, proportion of stem or stalk to leaf or frond, locality from which collected, processes to which subjected in drying, and perhaps other factors. Information as to the specific effect of each of these factors is sparse, but there is evidence that autumn collected laminaria is richer in the more digestible carbohydrates than is laminaria collected in spring. Notwithstanding these differences between various samples, the analysis of seaweed coupled with its digestibility places it in a particular category of foods. The percentage of protein in the dry matter of the weed varies from about 7 to 14 but of this only a small fraction is digestible, so that seaweed is a particularly poor source of protein for farm stock. The fat or ether extract varies from 1 to 2 per cent. and the digestible fat may be regarded as negligible. The percentage of fibre runs from about 5 to 12. Ash is the most variable ingredient, figures as low as 16 and as high as 34 per cent. of ash being found in the different samples tested, all of which were unwashed but free from adhering stones, shells or sand. The ash is rich in salt (sodium chloride), lime (calcium) and iodine and contains a great quantity of alkali salts which, when a large quantity of seaweed is fed, have a scouring effect on animals. Apart from the contribution made by the ash, the nutritive value of seaweed, from the chemical aspect, depends almost entirely on its carbohydrates of which there are different kinds present, some being freely digestible by farm stock, others being much less digestible but, on account of their jelling properties, having a favourable physical effect on the food tube of the animal. From the foregoing it is apparent that the value of seaweed may, on the whole, be assessed in terms of digestible organic matter. This is a preferable standard to digestible dry matter because of the variable ash content of seaweed, and, since the digestible fats are of negligible quantity, the digestible organic matter may be taken, in this case, as synonymous with total digestible nutrients, by the adoption of which as a measure of nutritive value data obtained from digestibility experiments with seaweed enable the seaweed to be given a value comparable with other foods used on the farm. Of the organic matter of various samples of laminaria tested over 50 per cent. was digested, and in the case of a couple, but not all, autumn collected samples as much as 65 and 67 per cent. respectively was digested, a level of digestibility which is reasonably high in comparison with other foods consumed by stock. The fucus type of seaweed showed a much lower organic matter digestibility, though a related type, namely ascophylum, was appreciably superior to the fucus and in digestibility approached the laminaria.

Seaweed meal, containing 10 to 12 per cent. of dry matter prepared commercially from weed which consisted either entirely or chiefly of laminaria, was used for the feeding experiments in which pigs, young store cattle, older stores, and laying fowl were utilised. Up to 20 per cent. of the meal ration was replaced by seaweed meal without any evidence of ill effects in the case of pigs and poultry, and up to 30 per cent. of the meal ration of cattle was so

replaced. In the several tests the seaweed meal was used to replace potatoes, bran, sugar pulp and a mixture of meals respectively, but on account of the fact that seaweed meal at all times formed only a minor part of the entire daily ration, the data collected can be used to give only an approximation to its true nutritive value in comparison with other foods.

For the purpose of comparison, the fodder unit figure for seaweed meal, that is the amount of seaweed meal which, when used to replace barley in a ration, has the same food value as one pound of barley, has been worked out in the case of each test. The following well-known fodder unit figures for the various foods compared with seaweed meal have been used—The fodder unit figures for average quality meadow hay and for oats are also included in the table.

Potatoes	4 *i.e.*	4 parts	potatoes	=1	part barley
Wheat bran	1.3 *i.e.*	1.3 ,,	wheat bran	=1	,, barley
Sugar pulp	1.2 *i.e.*	1.2 ,,	sugar pulp	=1	,, barley
Bulky meal mixture	1.3 *i.e.*	1.3 ,,	mixture	=1	,, barley
Less bulky meal mixture	1.2 *i.e.*	1.2 ,,	mixture	=1	,, barley
Average meadow hay	2.5 *i.e.*	2.5 ,,	av. meadow hay	=1	,, barley
Oats . . .	1.2 *i.e.*	1.2 ,,	oats	=1	,, barley

When, for instance, 4 cwts. of seaweed meal replace 3 cwts. of bran in the diet of pigs without altering the rate of progress, the fodder unit figure for seaweed meal works out at 1.3 (the fodder unit figure for bran) multiplied by 4/3 that is 1.7. Likewise, where in the diet of young store cattle, 17 cwts. of seaweed meal satisfactorily replace 10 cwts. of sugar pulp, the same rate of progress being maintained, the fodder unit of seaweed meal works out at 1.2 (the fodder unit figure for pulp) multiplied by 17/10 that is 2.0. In another case, when seaweed meal was used to replace portion of a bulky meal mixture fed to cattle, its fodder unit figure worked out at 2.5. Thus the several feeding tests returned fodder unit figures for the seaweed meal ranging from 1.7 to 2.5, so that the most favourable result gave the seaweed meal a food value which may be expressed by stating it to be 70 per cent. as good as oats, and the least favourable result gave it a value equal to that of meadow hay. This corresponds with the range of comparable food values for the laminaria type of seaweed as determined by the digestion experiments. As already indicated the material used in the group feeding tests consisted either solely or chiefly of laminaria, which the digestion tests showed to be much superior to the fucus type, the ascophyllum being intermediate between the laminaria and fucus.

The explanation of the variation in the figures representing the comparable food value of seaweed meal, as obtained from the feeding tests, lies principally in the varying proportion of ash or mineral matter in the samples fed and, to a lesser extent, arises out of the possibility of error incidental to testing a food

which must necessarily form only a minor portion of the total ration fed to the experimental animals. When the ash content is high the organic matter from which the food value, as determined in these experiments, is derived, is correspondingly low, and conversely when the ash is low the organic matter is high. In the latter case a hundredweight of seaweed meal obviously contains more nutrient material than in the former.

As washing the fresh weed with fresh water removes a considerable portion of the mineral matter the feeding value of a meal made from washed seaweed is obviously greater than that prepared from the unwashed material. Thus, if a meal made from unwashed laminaria is, for instance, equivalent to hay in nutritive value, washing of the sample prior to drying and grinding may raise the value to a level midway between hay and oats. The subjection of seaweed meal to hydrolytic treatment by boiling with 5 per cent. sulphuric acid for an hour and subsequently neutralising with soda does not raise the nutritive value of the organic matter.

The value of seaweed as indicated in the foregoing paragraphs ignores its merits as a source of minerals of which it contains a considerable variety, being particularly rich in lime, sodium chloride and iodine. Nor does it take into account the beneficial physical or mechanical effect of this food in the intestine of animals. In experiments on pigs, for instance, the addition of 8 per cent. of seaweed meal to a rather costive diet rendered the diet satisfactory, improving the health and rate of progress of the pigs. In this respect seaweed meal is comparable with such foods as linseed cake, bran, fresh green herbage and roots. When, however, a diet is already satisfactory from the physical aspect, as for instance when sufficient bran is incorporated with it, the addition of seaweed meal does not improve it any further. Seaweed meal merely functions in the food tube of animals as do the other mechanically useful foods. To produce this effect some 5 to 10 per cent. of seaweed meal in the food mixture suffices in the case of pigs and poultry. Cattle may require more if the remainder of the ration is costive in effect. Pigs, cattle, and poultry will consume a meal ration which includes 20 per cent., 25 per cent., and 20 per cent. respectively of seaweed meal. They may be induced to consume greater proportions of it, but when fed much in excess of these levels very special care must be taken to prevent the diet being rejected because of unpalatability.

SUMMARY.

Analytical figures, digestion experiments, and group feeding tests provide data for the assessment of the nutritive value of seaweed. Of the three types used, laminaria has the highest value, fucus the lowest, ascophylum falling in between. Different samples vary considerably in composition, the ash, which is high being the chief variable.

The amount of protein and of fat available from seaweed is more or less negligible. Ignoring the mineral content and the gelatinous properties of the

weed, the best sample of ground, dried laminaria examined worked out to be 70 per cent. as good as oats for feeding stock, while the worst sample examined had a food value equivalent to meadow hay, so that its utility as a food may be taken as lying between these two extremes. Since the ash provides no energy, a weed high in ash, thus having a low organic matter content, is comparatively low in feeding value, and a weed low in ash is comparatively higher in organic matter with a correspondingly higher feeding value. The washing of seaweed with fresh water considerably reduces the percentage of mineral matter.

Seaweed meal exercises a beneficial physical influence on the food tube, enabling the lower gut to function effectively. In this respect it is comparable with bran, linseed cake and roots. Five to ten per cent. of seaweed meal in a meal mixture suffices for this purpose, but farm animals will consume meal mixtures containing, in the case of pigs and poultry, twenty per cent. of seaweed meal and in the case of cattle a higher proportion. Seaweed is a rich source of the two minerals which are most likely to be deficient in the diet of house fed animals, namely, lime and salt (sodium chloride). It also contains an appreciable proportion of iodine as well as other mineral matter, some of which is responsible for the scouring effect of seaweed when consumed in large quantity.

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(Received for Publication, 5th November, 1946)

SIR ROBERT KANE'S LOST MAPS

A contemporary account, reprinted below, of Sir Robert Kane's Agrological and Government Valuation Maps has recently come to light in the pages of the *Dublin University Magazine* for August. 1853, the year of the Great Industrial Exhibition. It appears in the course of a contribution, appropriate to that event, entitled "Museum of Irish Industry" and is signed under the pseudonym "Intelligent Industry." The writer, clearly well-informed of the principles and scope of Kane's great projects, communicates the method followed in the collection of soil specimens, their classification and analysis, prior to the conclusions reached being expressed on coloured maps. To the history and purpose of these maps still unhappily missing, attention has already been directed in a joint article entitled: ***Sir Robert Kane's Soil Survey of Ireland*** in the issue of ***Studies*** for December, 1945, by Dr. R. C. Simington and Professor T. S. Wheeler. This article is with the kind permission of the Editor of ***Studies***, reproduced hereafter (page 15) for the convenience of readers who may not have seen it already.

"MUSEUM OF IRISH INDUSTRY"

"Were we to notice the long series of important analyses of rocks, of minerals, and waters, and other subjects of chemical inquiry of importance to geological science and to industry, which have occupied the laboratory of the Museum, we should exceed our space, and shall consequently merely select for illustration one example of inquiries of this class, as its nature and advantages are capable of general appreciation. This subject is the inquiry which is carried on into the chemical nature and agricultural capabilities of the soils of Ireland, and the means taken to represent the results by *agrological maps* of the Irish counties, and simultaneously to represent the distribution of the soils, according to their financial values, by a series of valuation maps. This undertaking, so novel in its character, and so interesting and important in its results, has been carried on by Sir Robert Kane and his able collaborateurs with so much energy that, as we understand, the valuation maps of nearly the entire of Ireland, and the agrological maps of several counties, are in a condition nearly ready for publication; we, therefore, do not hesitate to avail ourselves of the means afforded for giving an idea of this great undertaking.

"By the co-operation of the officers of the Geological Survey, which has been most freely accorded in this, as indeed on every occasion where the public interests were concerned, specimens of soils are selected from all parts of the several districts in which the survey is going on. The soil and sub-soil being both taken, and observations made as to the character of vegetation, the crops, the underlying rock, etc.; all these specimens are forwarded to the Museum to Sir Robert Kane. The precise spots that the specimens are taken from are indicated on the townland map, and transferred to the county index, which

thus gradually becomes covered with a net work of marks of soil specimen stations. The next step is their mechanical and chemical analysis. In this the gravels are first separated, and a preliminary classification made according to their quantity and nature; and it is found that by mapping the results thus obtained, as to the nature of the gravel of the agricultural soils and subsoils, a body of the most interesting geological information is obtained, regarding the distribution and origin of the drift of the most superficial and most recent formations. Thus the assistance afforded by the geologists in collecting the soils is reflected back with interest in the amount of special information on their own subject which the inquiry affords.

"After the separation of gravel, the true material of the soil remains, the nature of which is to be determined; and this is done, in the first instance, by the *classification analysis*, as it is termed—that is to say, the process to ascertain the class the soil belongs to. For this purpose, by processes which need not be here explained, but which are familiar to every chemist, the quantity of clay, of sand, of lime, and of organic matter, is determined. The relation between these determines the general character of the soil. Two great divisions of soils are recognised by Sir Robert Kane—the calcareous and non-calcareous. Of each of these classes the varieties of soil are—first, clay; second, clay loam; third, loam; fourth, sandy; fifth, peaty: the extremes being, plastic clay, pure marl, and pure peat. The arrangement of the soils under these classes at once shows the mode of distribution of the varieties of the agricultural soil over the district under examination, in a general way. But then comes an important matter: notwithstanding the care of the officers of the Geological Survey, there occur always blanks in their collection of specimens; and indications are given by the analyses of soils of such similarity or dissimilarity, or of such peculiar character, as to render further special and detailed inquiry desirable. Then a supplemental collection is made by a special officer, under the instruction of Sir Robert Kane, who, intersecting the stations of the survey officers, and examining the places they left unexplored, and specially investigating all points on which the previous inquiry had directed attention, prepares another set of soils for analysis; and further, a well-educated agriculturist being selected for this purpose, he draws up a report of his observations on the localities in a farming and practical point of view, to serve as a means of comparison and testing of the purely scientific results. This new series of specimens is then analysed as the first, and the results all tabulated. But then, the precise nature of the soils of that district, of each class, has to be still further ascertained in the following manner:—As the number of specimens examined in a single county amounts to hundreds, and that even the classification analysis already described, and the examination of the gravel, is in itself an enormous task, the absolutely detailed analysis of such a multitude of specimens, of which whole scores are almost perfectly alike, would be totally unnecessary, and, indeed, practically impossible. A selection is, therefore, carefully made of well-characterised examples of each

class of soils from each part of the county where that class of soils prevails; and all very peculiar or exceptional instances are also taken up. These specimens are then subjected to the most complete and refined analysis which chemical science admits. The alkalies (potash and soda), the magnesia; the phosphoric acid, the nitrogen, the soluble silica, and all other matters of any possible agricultural or scientific interest are determined. When this is done, there has been collected a body of precise, scientific, and practical information as to the soils of the locality, such as we feel justified in asserting had never been obtained on any previous occasion, or in any other country. Then comes the task of representing these results. For this purpose Sir Robert Kane has adopted the principle of indicating the nature of the soil by colours on a map. This had been often done, but on no specific principle, and not on any classification based on numerical scientific grounds. The colours, also, had been merely arbitrary. The colours in Sir Robert Kane's agrological maps represent a natural principle, and a mass of numerical facts. Multitudinous as are the constituents of a soil, Sir Robert Kane represents its agricultural and chemical nature to the eye by two colours—blue and red. Each of these colours represents a chemical constituent—clay and lime. The cold colour, blue, typifies the plastic, adhesive, heavy, and cold nature of the soil; different degrees of these qualities are given by graduated shades of blue. Red, the warm colour, typifies lime as an element, and indicates warmth, lightness, friability, as the agricultural character, graduated in quality as in depth of shade. These colours overlapping, give the intermediate soils—the calcareous clays and calcareous clay loams, indicated by shades of purple. Thus, with that simplicity to which full investigation generally leads, the chemical nature and agricultural character of the soils of a large district are given with a completeness and distinctness which must afford most valuable aid to all who wish to know the actual resources of our agricultural soils, and the most proper means for their effective development.

"But, then, agrological maps even are not all that is done in this direction. One of the most interesting and practically valuable series of documents we have for a long time seen, has been prepared by Sir Robert Kane, originally merely to afford him a means of testing the relation which might, and indeed ought to, exist between the scientific nature of the soil and its financial value. But the results have been found of such practical interest and convenience, that its completion became almost necessary for its own sake. It consists in representing on a map (the Ordnance County Index) the financial value, as officially established by valuations (Griffith's, in the first instance, checked by comparison with Poor-law Union returns), by means of a scale of colours suitably arranged. The result is exceedingly striking. A single glance at one of these *Valuation Maps* affords a better idea of the real nature of a district of country than could be derived from any amount of study of long columns of figures, which cannot have any similar distinctness and coherence; whilst a detailed examination shows that on every point the special information as to

value can be at once, and most accurately obtained, by reference to the scale. The result here, as in the case of the agronomical maps, is so simple that we are tempted to forget the enormous labour by which it has been obtained; but we must recollect, that besides all the chemical toil already referred to, two tasks, left undone by the Ordnance Survey Office, have had to be effected—the one, the transference to the county index maps of all the townland boundaries of the six-inch scale; and the second, that all the determinations of heights of the townland maps have had to be transferred to the county indexes, to enable Sir Robert Kane to prepare Contour Maps of the Counties (a work only now very slowly carried on in the north of Ireland, by the remnant of the Ordnance Survey Staff still left in Ireland), for the purpose of that special study of the physical surface of the country, which was considered necessary, as a preliminary to the construction of agronomical maps. Having said so much, we shall not do more than name the mass of calculations and reductions to scales which such works required—a labour requiring an amount of time, and of accuracy, and of system, which can scarcely be appreciated by any but those who have been engaged in similar undertakings.

"By means of such investigations and such maps, the real nature and values of our soil and country are being represented for us with a scientific completeness and a practical usefulness beyond anything that has been attempted in any other country, even the most advanced. The geological maps, useful as they are for mining and engineering purposes, and for general scientific objects, have little or no reference to the practical agricultural character of the soil, except in some very few and limited localities, where the extreme softness of the underlying rock and the peculiarity of its decomposition allows the surface soil to be formed directly from its wear. Thus it is in the chalk, and some other districts of the sister kingdom; and from such cases agriculturists have derived those vague ideas as to the connexion of geology with agriculture, which may, from unsuitable and inappropriate application, lead, and have often led, to serious practical evil. For the fact is, as has been well remarked by Professor Johnstone, in his valuable "Report on the Geology and Agriculture of New Brunswick," that the underlying rock has very seldom any necessary connexion with the surface agricultural soil. The study of the latter, and the representation of its nature, must, therefore, be taken up on other and independent grounds; and hence the special interest and importance of the great undertaking in which Sir Robert Kane and his colleagues are engaged, and in which we trust they will receive full and satisfactory support.

"Like as in so many other cases, however, whilst we find it necessary thus to explain to our own people the magnitude and interest of an institution, and of investigations organised for their own benefit, those labours have met their fullest recognition and practical appreciation in other countries. By a decree of the new Emperor, there is to be undertaken in each department of France an agronomical survey, and agronomical maps, to represent the soil of France, as that of Ireland is being represented by the maps of the Museum of

Industry; and the scientific officer charged with the execution of the survey and maps of the Departments of the Seine and of the Oise—those first in progress—has been in Dublin to study, at the Museum of Irish Industry. the principles upon which the Irish investigations are carried on, and the manner in which the results are indicated.

"In Canada, similarly, the necessity for scientific inquiry, and representation of the nature of the agricultural soil is felt, and a survey determined on; and the Canadian commissioner, like the French professor, has been to learn, in Stephen's-green, the manner in which the work under Sir Robert Kane is conducted. We may well take some credit to ourselves and to our country for this, that in so many points of practical industrial interest, the signal and direction of progress is given by Irishmen, and in Ireland; and it should teach us the salutary lesson that we should not, on all occasions, leave to foreign powers and foreign institutions the task of manifesting proper appreciation of Irish work."

It is hoped that the reproduction of the foregoing excerpt from the article in the *Dublin University Magazine* will stimulate further enquiry leading to the recovery of the missing maps.

R. C. Simington: T. S. Wheeler.

SIR ROBERT KANE'S SOIL SURVEY OF IRELAND

THE RECORD OF A FAILURE †

By R. C. Simington and Professor T. S. Wheeler

Introduction

On November 13, 1848, Sir Robert Kane[1]* described to the Royal Irish Academy[2] a project for a soil survey of Ireland which, as Director, he had initiated in the Museum of Irish Industry soon after its foundation in 1845. This project was planned on a most ambitious scale; for it involved, for each of the 60,000 townlands[3] of Ireland, a comparison of the value of the soil as determined by chemical analysis with the practical value given in the official land valuation begun by Griffith[4] in 1830. For the purposes of comparison, Kane had decided to transfer, to the county index maps (half-inch to the mile) of the Ordnance Survey, the townland boundaries shown on the six-inch maps and to colour each townland area with a tint corresponding to the average value in shillings per statute acre, which seldom exceeded 36. Each colour related to a range of 2s., but the actual colours used were not given by Kane in his address. The "detailed" maps so formed gave a pictorial representation of the different classes of land; but, although necessary for his investigations, they were, in Kane's opinion, too crowded for general use. He had, accordingly, based the detailed system of tints used on five typical colours related to classes of land as follows:—

Typical Tints	Types of Land
Black	Waste (0-2 shillings per acre)
Brown	Inferior
Yellow and Green ..	Medium
Blue and Purple ..	Superior
Red	Artificially valued owing to local circumstances, *e.g.*, proximity to towns (usually above 32 shillings per acre).

Using the five tints, Kane had prepared other "generalized" maps showing

†Reproduced from *Studies* of December, 1945; see p. 10.
*All the notes will be found at the end of the article.

the values of groups of townlands reduced to an average of value. He exhibited examples of both types of maps[5] to the Academy, and pointed out that they illustrated the several influences under which the practical values of soils depend—*e.g.* elevation above sea level, proximity of towns, direction of great roads, chemical constitution of the soil, geological character of the locality. Kane concluded by stating that, while the chemical composition of a soil will indicate its power to supply the materials necessary for the growth of plants, its practical fertility will depend also on other mechanical and "meteoric" (*sic*) conditions. To eliminate these and to estimate their relative influences, he thought it desirable to contrast, under the form of maps, the chemical constitution of the soils of the several districts and their relations to climate with the practical standard of value given by the official valuation. The conversion of the numerical estimates of the valuations into a feasible and pictorial representation had been the principle of the construction of the maps now laid before the Academy.

Kane's project, therefore, involved the construction of two series of maps, both based on the half-inch County Index Maps:—

1. A series of valuation maps of the Irish counties, representing the distribution of the financial value of land. There were two kinds of such maps for each county: in the "detailed" map the position, limit and average financial value (shown by a colour) were given for every individual townland, while in the "generalized" map the individual townlands were not marked, but the values were grouped and areas coloured according to the five types of soils indicated above. For ordinary practical purposes Kane considered the generalized maps sufficient.

2. A series (not shown to the Academy) of what Kane called "agrological" or "agronomical" maps—soil maps— representing the chemical composition and state of mechanical aggregation of the agricultural soil in each county in Ireland.

It is convenient to trace separately the history of each of these ill-fated efforts; and since the valuation maps were based on Government Valuations carried out under the direction of Griffith, an account of the complex legislation enacted over the period 1826-1852 and of Griffith's administration may be of interest.

Valuation of Ireland

The first General Valuation, known as the "Townland Valuation," though it was commenced by Griffith as Commissioner of Valuation in 1830 in accordance with the provisions of the 7 Geo. IV., c. 62 (1826)[6], was mainly carried out under an amending Act,[7] the 6 & 7 Will. IV., c. 84, passed in 1836. It was the intention of Government, as manifested by these opening Acts of

SCHEME FOR THE DISTRIBUTION OF PEDIGREE STOCKS OF SEED OATS.

Under the Department's scheme nucleus stocks of pedigree Victory II and Glasnevin Triumph which were propagated in the Ballinacurra district in 1945 were distributed to the undermentioned in the Spring of 1946, on the condition that the recipients would multiply them and retain the produce, if suitable, for seed purposes.

GLASNEVIN TRIUMPH.

The Superintendent, Agricultural School, Athenry, Co. Galway.
The Superintendent, Agricultural School, Ballyhaise, Co. Cavan.
Messrs. Pedigree Seed Growers, Ltd., 151 Thomas Street, Dublin.
The Superintendent, Agricultural School, Clonakilty, Co. Cork.

VICTORY II.

The Superintendent, Agricultural School, Athenry, Co. Galway.
The Superintendent, Agricultural School, Clonakilty, Co. Cork.
The Superintendent, Agricultural School, Ballyhaise, Co. Cavan.
Messrs. Pedigree Seed Growers, Ltd., 151 Thomas Street, Dublin.
Messrs. J. H. Bennett, Ltd., Ballinacurra, Midleton, Co. Cork.

The Albert Agricultural College co-operated with the Department in the working of the foregoing scheme and stocks were distributed as follows :—

ARDRI.

	brls.	sts.
Brooksby Hall, Agricultural Training Centre, Melton Mowbray, Leicestershire	—	12

GLASNEVIN SUCCESS X.

	brls.	sts.
Messrs. J. H. Bennett, Ltd., Ballinacurra, Midleton	8	0
Cereal Station, Ballinacurra, Co. Cork	2	0
Messrs. W. Drummond & Sons, Ltd., 57/58 Dawson St., Dublin	5	0
Messrs. Pedigree Seed Growers, Ltd., 151 Thomas St., Dublin ..	26	0
The Rector, Agricultural College, Warrenstown, Drumree, Co. Meath	5	0

WHEAT.

In 1946 a propagation plot of April Red Bearded wheat was grown at the Cereal Station, Ballinacurra, Co. Cork, and an extension plot of seven acres of the same variety was grown under contract and under the Department's supervision by Messrs. J. H. Bennett, Ltd., Ballinacurra, Co. Cork. Under the scheme for the distribution of pedigree seed of spring wheats the produce of the 1945 extension plots of April Red Bearded was distributed to the undermentioned in the spring of 1946, on condition that the produce would be used for further propagation in 1947.

Messrs. Pedigree Seed Growers, Ltd., 151 Thomas Street, Dublin.

FLAX.

At the Cereal Station, Ballinacurra. Garden plots of the following varieties were grown :—Redwing, Bison, Buda, Newlands, Argentine Linseed, Boley Golden and Concurrent.

SWEDES.

At the Cereal Station, Ballinacurra, seed stocks were raised from selected roots.

Seed thus produced was distributed to the following :—

Messrs. Associated Seed Growers, Ltd., 16, Westmoreland Street, Dublin.
Messrs. Seed Producers, Ltd., Dame Street, Dublin.

OATS.

Pure Line.—A single plant selection and a garden plot of Black Tartary oats were grown at the Cereal Station in order to maintain a pure line stock of this variety.

DEPARTMENT'S EXTENSION PLOTS.

In order to have available for distribution stocks of Pedigree seed oats, Extension Plots of Glasnevin Triumph and Victory II oats were grown under agreement with selected farmers in the neighbourhood of Ballinacurra. These stocks were grown, harvested and threshed under the Department's supervision. The produce was kiln-dried, cleaned and made available for distribution in the spring of 1947.

GLASNEVIN TRIUMPH.

The following are the names and addresses of growers, together with the acreages and amounts of seed sown :—

	acres	brls.	sts.
J. Barter, Inchiquin, Killeagh, Co. Cork	12	13	10
S. Northridge, Ballymacsliney, Midleton	4	4	8
D. Keohane, Gortacrue, Midleton, Co. Cork	9½	10	12
Mrs. Bourke, Ballintotas, Midleton	5½	6	4
P. O'Keeffe, Ardra, Rostellan, Co. Cork	4	4	8
	35	40	0

VICTORY II.

	acres	brls.	sts.
Wm. Tait, Hermitage, Rostellan, Co. Cork	8	9	2
Wm. Tait, Buckstown, Rostellan, Co. Cork	7	8	0
J. Hegarty, Ballinbeg, Rostellan, Co. Cork	4	4	8
J. Tait, Inch, Glebe, Whitegate, Co. Cork	6	6	12
C. Garde, Inch, Whitegate, Co. Cork	6	6	12
R. Scanlon, Geragh, Midleton, Co. Cork	4	4	8
	35	40	0

FRUIT CROP REPORT, 1946

The year 1946 compared very favourably with good fruit years of the past, especially in the case of apples and pears. Bush and soft fruits, too, gave very satisfactory returns and only in the case of plums and damsons were the yields below normal.

Apple trees blossomed profusely and though cold east winds and low temperatures prevailed during the entire blossoming period, there was an absence of frost and most varieties set full crops of fruit.

Weather conditions from June to September were unfavourable for fruit development and there was evidence of considerable cracking and russetting of apples in all areas. Apple Scab was difficult to control owing to weather conditions which favoured the spread of the disease and except in cases where spraying was continued well into July, there was a fair proportion of the crop affected. In general, the fruit was under-sized.

Plums and damsons set fair crops but wet, cold conditions adversely affected development of the fruit and there was a good deal of splitting during the ripening stage.

Soft fruits on the whole produced satisfactory crops although size of berries and period of cropping were affected by a long spell of dry weather. Cold east winds had an adverse effect on the setting of black currants in exposed situations.

The gooseberry sawfly caterpillars caused serious damage to the foliage where control measures were not employed. Cluster Cup was very much in evidence on the fruit in the Northern and Western districts of the country.

Periods during which the various fruits were on offer in commercial quantities in Dublin Market.

Apples: Gas stored of the 1945 crop up to 5th May, 1946, and the 1946 crop from September onward.
Plums: 23rd July to 28th September.
Damsons: 3rd September to 28th September.
Gooseberries: 14th May to 16th August.
Strawberries: 12th June to 9th August. (Forced strawberries from 6th April). (French strawberries 28th May to 14th June).
Raspberries: 3rd July to 3rd September.
Loganberries: 29th June to 2nd August.
Black Currants: 29th June to 7th August.
Red Currants: 6th July to 2nd August.

MARKET PRICES.

Apples:

Dessert varieties:	Early ..	..	12/- to 16/- per stone.
	Mid-Season	..	7/- to 15/- ,,
	Late ..	..	6/- to 15/- ,,
Culinary varieties:	Early ..	..	2/6 to 8/- per stone.
	Mid-Season	..	1/6 to 5/- ,,
	Late ..	..	1/- to 5/- ,,

Culls and crab apples for manufacturing purposes 10/- to 12/- per cwt.

Plums:
10/- to 40/- per 12 lb. chip.
Jam fruit 36/- to 48/- per cwt.

Damsons:
6/- to 10/- per 12 lb. chip.
Jam Fruit 40/- to 46/- per cwt.

Gooseberries:
6/- to 18/- per 12 lb. chip.
Jam Fruit 42/- to 44/4 per cwt.

Strawberries:
2/6 to 7/6 per lb. for early arrivals.
Later 1/6 to 3/- and up to 4/6 per lb.
Jam Fruit 79/4 to 84/- per cwt.

Raspberries:
1/- to 2/4 per lb.
Jam Fruit 66/- per cwt.

Loganberries:
1/3 to 2/- per lb.
Jam Fruit 60/- per cwt.

Black Currants:
1/- to 2/3 per lb.
Jam Fruit 84/- per cwt.

Red and White Currants:
10d. to 1/6 per lb.
Jam Fruit 54/8 per cwt.

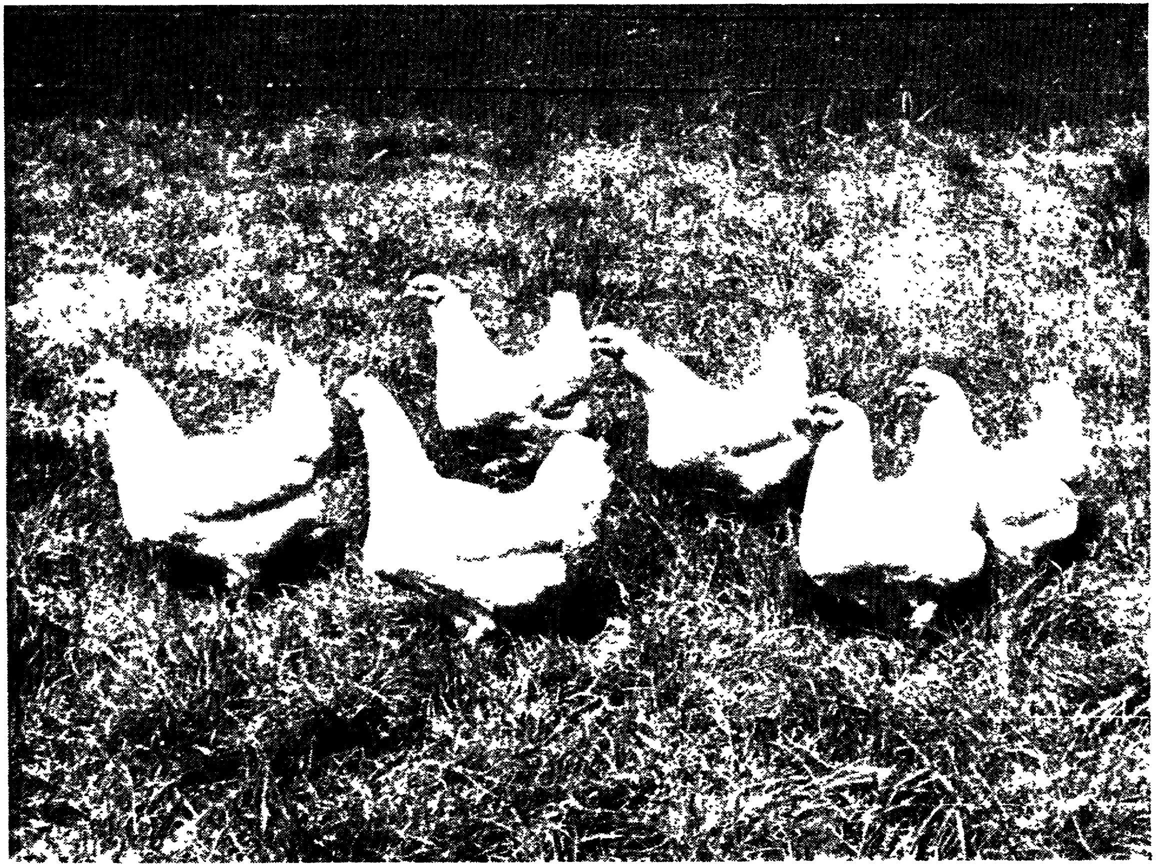
Blackberries:
46/- to 54/- per cwt.

Bilberries:
8/- per stone.

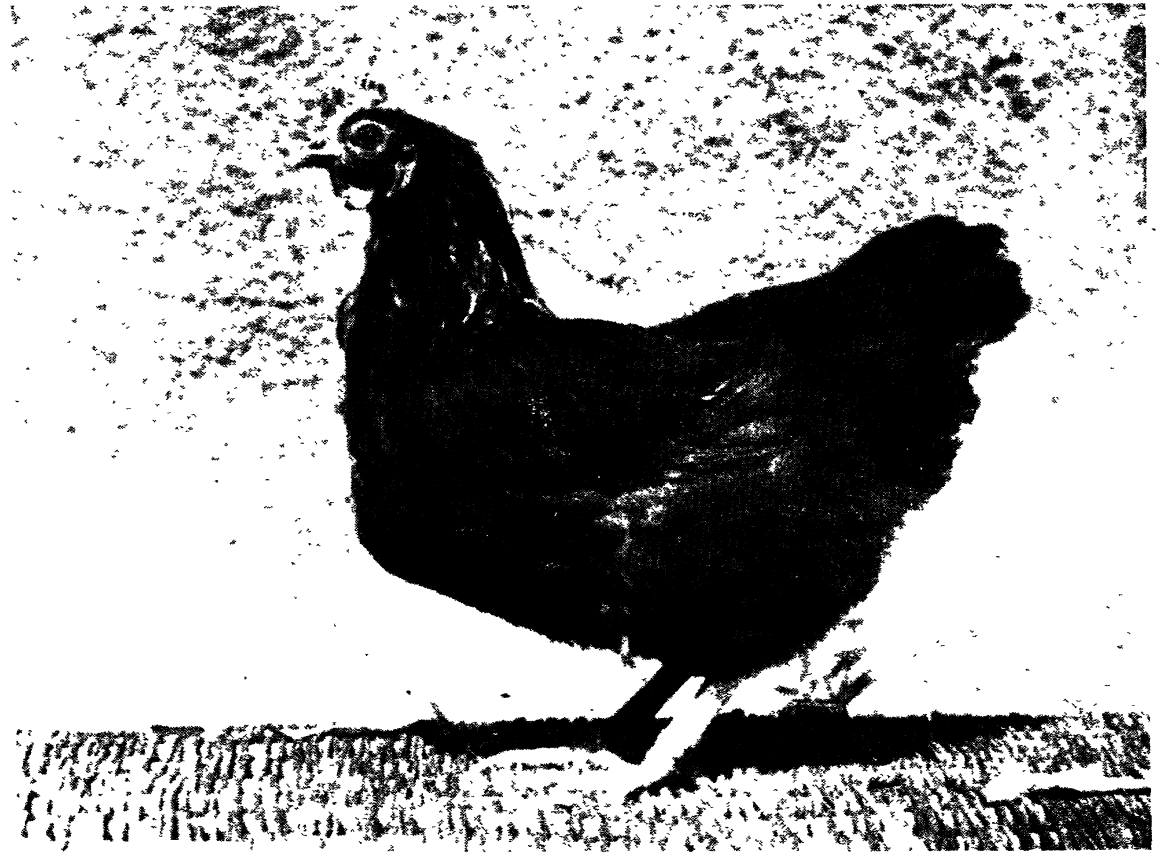
Table Showing in a General Way the Nature of the Yields Obtained in Each County

County	Gooseberries	Strawberries	Raspberries	Loganberries	Red and White Currants	Black Currants	Apples	Pears	Plums	Damsons	Other Fruits
CARLOW ..	Good	Good	Good	Good	Average	Very Good	Very Good	Good	Below Average	—	—
CAVAN ..	Good	Good	Average	Good	Good	Good	Good	Average	Good	Average	—
CLARE .	Good	Good	Average	Good	Average	Good	Very Good	Good	BelowAverage	Below Average	Average
CORK ..	Very Good	Good	Good	Very Good	Good	Very Good	Very Good	Very Good	Below Average	Below Average	Good
DONEGAL	Good	Good	Very Good	Good	Good	Average	Very Good	Good	Below Average	Below Average	—
DUBLIN ..	Good	Good	Average	Good	Good	Average	Below Average	Average	Poor	Poor	Average
GALWAY .	Good	Average	Average	Good	Good	Very Good	Very Good	Average	Below Average	Below Average	—
KERRY ..	Average	Very Good	Good	Good	Good	Very Good	Very Good	Average	Average	Average	Average
KILDARE ..	Good	Average	Average	Good	Good	Good	Good	Good	Average	Average	—
KILKENNY ..	Good	Average	Below Average	Good	Good	Good	Very Good	Good	Below Average	Below Average	Good
LAOIGHIS ..	Good	Good	Average	Average	Good	Good	Very Good	Average	Below Average	Below Average	Good
LEITRIM ..	Average	Average	Good	Good	Good	Average	Average	Good	Below Average	Below Average	Average
LIMERICK ..	Good	Good	Good	Good	Good	Very Good	Very Good	Very Good	Average	Average	Good
LONGFORD ..	Average	Average	Average	—	Average	Good	Very Good	Good	Below Average	Below Average	Average
LOUTH	Good	Good	Good	Good	Good	Very Good	Very Good	Good	Below Average	Below Average	Good
MAYO ..	Average	Good	Average	Good	Below Average	Average	Very Good	Average	Poor	Poor	Average
MEATH ..	Very Good	Average	Below Average	Average	Good	Good	Good	Good	Good	Good	Good
MONAGHAN .	Good	Good	Good	Average	Average	Below Average	Good	Good	Average	Average	Below Average
OFFALY ..	Good	Good	Good	Good	Good	Very Good	Good	Very Good	Average	Average	Good
ROSCOMMON. .	Very Good	Average	Average	Good	Good	Good	Very Good	Average	Average	Average	Good
SLIGO ..	Average	Average	Below Average	Good	Below Average	Good	Good	Average	Good	Good	—
TIPPERARY N.R. ...	Good	Good	Good	Good	Good	Very Good	Very Good	Good	Good	Average	Average
TIPPERARY S.R. ...	Good	Good	Good	Average	Good	Good	Very Good	Good	Average	Average	Average
WATERFORD. .	Good	Good	Good	Good	Good	Good	Very Good	Good	Below Average	Below Average	Average
WESTMEATH...	Good	Good	Average	Good	Good	Very Good	Very Good	Good	Good	Good	Average
WEXFORD ...	Good	Good	Good	Good	Good	Good	Average	Below Average	Below Average	Below Average	Below Average
WICKLOW ...	Very Good	Good	Good	Good	Good	Very Good	Good	Good	Average	Average	Average

NATIONAL EGG-LAYING TEST, 1945-46



Pen No. 7 (White Wyandotte), owned by Sister-in-Charge. St. Martha's College, An Uaimh, Co. Meath, which won the Silver Cup.



Bird No. 188 (Pen No. 36, Rhode Island Red), owned by Mrs. E. O'Donnell, Kilbreedy West, Killmalock, Co. Limerick, awarded the Special Prize for the bird (sitting breed) scoring the higest number of points during the Test.

NATIONAL EGG-LAYING TEST, 1945-46.

The Thirty-fourth Egg-Laying Test, conducted by the Department of Agriculture, was held at the Munster Institute, Cork, during a period of 46 weeks, beginning on 1st October, 1945, and ending on 18th August, 1946. A total of 92 pens, each consisting of six pullets, having fulfilled the required conditions, was accepted and arranged in Sections as follows:—

Section I.—White Wyandotte	12 pens
Section II.—White Wyandotte (confined to holders of Hen or Hen and Duck Stations in 1945)	12 „
Section III.—Rhode Island Red	20 „
Section IV.—Rhode Island Red (confined to holders of Hen or Hen and Duck Stations in 1945)	23 „
Section V.—Any non-sitting breed	12 „
Section VI.—Any other utility breed	13 „

Station holders were, as heretofore, allowed to enter a second pen in one of the open sections.

Only pullets which were certified by the Veterinary College, Ballsbridge, Dublin, as being non-reactors to the agglutination test for bacillary white diarrhoea were accepted.

Minimum Weights. The following were the prescribed minimum weights for the respective breeds:—

All non-sitting breeds ..	3 lb.
White Wyandotte	4½ lb.
Rhode Island Red	4½ lb.
Plymouth Rocks	5 lb.
Sussex	5 lb.
Any other sitting breed ..	5 lb.

Eggs were graded as follows :—

Egg Grades.

Special Grade.—2$\frac{1}{8}$ ozs. and over for the first eight weeks (1st October to 25th November, inclusive), 2$\frac{1}{4}$ ozs. and over throughout the remainder of the test.

First Grade.—A minimum of 1$\frac{15}{16}$ ozs. for the first eight weeks (1st October to 25th November, inclusive). and a minimum of 2 ozs. during the remainder of the test.

Eggs which weighed less than the weight prescribed for first grade were recorded but were not counted for scoring purposes.

System of Scoring.

The system of scoring for the award of prizes was as follows :--

(*a*) Only special and first-grade eggs were counted for scoring purposes.

(*b*) The scoring for each egg of these grades was similar and as follows :—

Three (3) points for the first 12 weeks (1st Oct. to 23rd Dec.).

Two (2) points for the next 24 weeks (24th Dec. to 9th June).

Three (3) points for the remaining 10 weeks (10th June to 18th August).

(*c*) Points were not awarded for eggs defective in colour, shape or shell texture, but all such eggs were included in the records of production.

Ineligibility for Section Prizes.

Section prizes were not awarded to pens which produced less than 900 scoring eggs nor special prizes to those laying less than 1,000 scoring eggs.

The following birds were not eligible for individual awards :—

(1) Birds that failed to complete the test.

(2) Birds that failed to pass the blood agglutination test for bacillary white diarrhœa at the conclusion of the test, and those showing breed or other defects considered undesirable in breeding stock.

(3) Birds that failed to reach, at the conclusion of the test, a body weight of half a pound over the minimum weight prescribed for the breed at the commencement of the test.

Egg Yields. Making no allowance for deaths, the average number of eggs per bird was 164.9. The average number of eggs per bird for which a record for the full 46-week period was available was 176.0 (see Table II). The corresponding figures in the previous test were 173.9 and 185.8 respectively. The average production per bird during each of the twelve periods for each breed is given in Table III.

Egg Size. Seven pens produced more than 20 per cent. of eggs under first grade.

Egg Weights. The average weight of egg for each of the competing breeds is shown in Table IV. The average weight per dozen eggs for all breeds was 26.8 oz., which is the same as that for the previous test. In Table V are given the number and percentage of the different grades of eggs for each breed in respect of birds which completed the full 46-week period.

Copper Rings. Of the 491 birds which completed the full 46-week period, 91 or 18.5 per cent. laid 200 or more special and first-grade eggs and not more than 20 per cent. under first grade. Of these, 80 were leg-banded with numbered sealed copper rings. Copper rings were withheld from the following 11 birds which were not suitable for breeding purposes :--

(*a*) Breed Standard Defects :—
1 White Wyandotte.
8 Rhode Island Red.

(*b*) Under Prescribed Weight :—
1 White Wyandotte.

(*c*) Consistent Producer of Defective Eggs :—
1 Light Sussex.

The rings were distributed as follows :—

2 pens	five copper rings each
1 pen	four ,, ,, ,,
6 pens	three ,, ,, ,,
13 ,,	two ,, ,, ,,
22 ,,	one ,, ring ,,

The egg records for birds which were awarded copper rings are shown in Table VIII.

A total of 152 birds, representing 31.0 per cent. of the number surviving the full period of the test, laid over 169 but less than 200 special and first-grade eggs. Birds which laid more than 20 per cent. of eggs under first grade are not included in the foregoing total (see Table VII).

Mortality. During the period of the test 61 birds died, representing a mortality of 11.1 per cent., and a decrease of .4 per cent. as compared with the previous test. The distribution of the total deaths amongst pens was as follows :—

4 pens	.. ..	4 deaths each.
8 ,,	.. ..	3 ,, ,,
6 ,,	.. ..	2 ,, ,,
24 ,,	.. ..	1 death ,,

In the remaining 55 pens all birds completed the test. Table IX gives particulars of the birds that died and the cause of death in each case.

The greater proportion of the mortality was caused by peritonitis and oviductitis. The incidence of lymphomatosis in various forms and of tuberculosis were higher than in recent Tests.

B.W.D. Test. At the conclusion of the test the birds were submitted to the agglutination test for bacillary white diarrhœa, and there were no reactors.

Feeding. The system of feeding was similar to that in previous tests. The birds were fed three times daily. The morning feed consisted of half the grain ration ; the mid-day feed of wet mash, and the evening feed of the remainder of the grain ration. Dry mash was fed *ad lib.* and was made up to the following formula. :—

2 parts by weight	Barley Meal.
2 ,, ,, ,,	Pollard.
2 ,, ,, ,,	Rolled Oats.
2 ,, ,, ,,	Crushed Oats.
1 part ,, ,,	Fishmeal.
1 ,, ,, ,,	Bran.
½ ,, ,, ,,	Dried Yeast.

The wet mash consisted of equal parts by weight of the dry mash and boiled potatoes. Cabbage, kale, turnips and mangels were fed during winter and spring. Limestone grit was allowed *ad lib.*

NOTES ON COMPETING BREEDS.

WHITE WYANDOTTE.

Sections I and II. The twenty-four pens in these sections, with a few exceptions, consisted of well-developed birds of good quality. Egg production in the breed was lower than in the previous test. Egg size was satisfactory but some birds consistently produced eggs of poor quality. Mortality was unduly high in these sections.

The winning pen, No. 7—in Section I, entered by the Sister-in-Charge, St. Martha's College, An Uaimh, County Meath—also won the Silver Cup for the best pen in the test. The birds in this pen were of high quality and laid 1,306 special and first-grade scoring eggs in the forty-six week period.

RHODE ISLAND RED.

Sections III and IV. The birds in the forty-three pens in these sections were of good size and quality. One pen was backward on arrival at the test and birds showing breed defects were included in a number of pens. Egg yield was lower than in this breed in the previous test, but egg size and quality reached a high standard. The low mortality and general health of the birds were most satisfactory.

ANY NON-SITTING BREED

Section V. Twelve pens of White Leghorns were included in this section. Apart from a few pens, the birds entered were of poor quality, many being undersized and immature on arrival at the test. Egg production was poor. Size and shell quality of eggs were satisfactory, but mortality in this breed was very high.

ANY OTHER UTILITY BREED.

Section VI. This section was made up of eleven pens of Light Sussex and two pens of Buff Plymouth Rocks. Many of the Light Sussex entries were of good type and quality, but too many pens carried small birds of poor type. Production in the Light Sussex breed was generally disappointing, but egg size and quality were good. The health of the birds was very satisfactory and mortality was low. The two pens of Buff Plymouth Rocks were well developed and fair specimens of the breed, but the colour of some birds was poor. Egg production was low, but egg size and quality were satisfactory. Mortality was at a low level.

CONCLUSION.

The results of the test were disappointing. Egg production was low in the early months of the test and did not reach a satisfactory level subsequently. Size and quality of eggs were well up to standard and mortality, although high, was slightly lower than in the previous test. Many birds entered were not good specimens of their breed and breeders should devote more attention to breed standards when selecting breeding stock and laying test entries.

TABLE I.

The following Table shows the egg production for each of the thirty-four tests held since 1912-13 :—

Test Period	No. of Birds	No. of Eggs Laid	Average Number per Bird
Forty-eight weeks ended —			
31st Aug., 1913	318	38,190	120.1
,, 1914	282	39,216	139.0
,, 1915	264	39,764	150.6
,, 1916	294	49,830	169.5
,, 1917	210	36,660	174.6
,, 1918	210	36,106	171.9
,, 1919	306	55,124	180.0
,, 1920	354	65,840	186.0
,, 1921	288	51,584	179.0
9th Sept., 1922	342	63,518	185.7
16th ,, 1923	198	38,519	194.5
15th ,, 1924	342	61,144	178.8
15th ,, 1925	348	63,755	183.2
15th ,, 1926	342	65,137	190.4
16th ,, 1927	492	93,912	190.9
16th ,, 1928	510	95,226	186.7
16th ,, 1929	540	101,820	188.6
16th ,, 1930	588	100,752	171.3
16th ,, 1931	588	111,180	189.1
15th ,, 1932	600	111,986	186.6
12th ,, 1933	606	113,047	186.5
10th ,, 1934	606	112,177	185.1
7th ,, 1935	702	131,384	187.1
3rd ,, 1936	702	130,940	186.5
Forty-six weeks ended :—			
18th Aug., 1937	708	125,621	177.4
18th ,, 1938	678	126,143	186.1
18th ,, 1939	708	133,306	188.3
17th ,, 1940	672	121,250	180.4
18th ,, 1941	642	114,617	178.5
18th ,, 1942	438	77,640	177.3
18th ,, 1943	510	88,167	172.9
17th ,, 1944	546	91,903	168.3
18th ,, 1945	546	94,956	173.9
18th ,, 1946	552	91,038	164.9

It should be noted that the figures given in Table I above are based on the total number of birds competing, no allowance having been made in respect of deaths.

Taking the birds which died during the 1945-46 test into account only up to the date of death, the average number of birds for the whole period was 527.5 and the average number of eggs per bird 172.6.

TABLE II.

Average Egg Yield for each Breed.

BREED	Number of Birds for full period	Number of Eggs Laid	Average Number of Eggs per Bird	GRADE AVERAGES PER BIRD		
				Special	First	Under First
White Wyandotte ..	123	22,978	186.8	106.9	67.4	12.5
Rhode Island Red ..	238	42,480	178.3	105.5	59.4	13.4
White Leghorn ..	57	9,357	164.2	83.7	68.9	11.6
Light Sussex	62	10,019	161.6	68.2	75.3	18.1
Buff Rock	11	1,656	150.5	93.0	52.2	5.3
All Breeds	491	86,440	176.0	98.3	64.3	13.4

TABLE III.

Average Egg Yield per Bird during each of the Twelve Periods.

BREED	Number of Birds for full period	Oct. 1–Oct. 28	Oct. 29–Nov 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Average for full period
White Wyandotte	123	11.4	13.0	15.0	15.7	17.6	18.2	20.3	19.1	17.7	16 0	15.5	7 3	186.8
Rhode Island Red	238	9.6	11.2	13.6	15.1	16.1	18.0	20.7	20.2	17.9	15.4	14.2	6.3	178.3
White Leghorn ...	57	8.9	9.9	11.8	13.6	16.3	17.8	18.9	18.1	15.9	13.8	14.2	5.6	164.2
Light Sussex ...	62	10.9	10.1	12.1	13.7	15.2	17.6	19.0	17.0	15.0	13.8	11.8	5.9	161.6
Buff Rock	11	4.7	10.1	13.6	14.4	17.5	18.1	18.2	14 5	14 1	11.2	9.7	4.4	150.5
All Breeds ...	491	10.0	11.8	13.5	14.9	16.4	18.0	20.1	19.1	17.2	15 0	14.1	6.4	176.0

TABLE IV.
Average Weight of Egg for each Breed.

Breed	Total Number of Eggs Laid	Total Weight of Eggs	Average Weight of Egg	Average Weight per dozen
		lb. oz. dr.	*oz. dr.*	*oz.*
White Wyandotte ..	24,796	3,459 12 1	2 4	26.8
Rhode Island Red ..	44,248	6,211 9 14	2 4	27.0
White Leghorn ..	10,148	1,897 15 5	2 3	26.4
Light Sussex	10,176	1,384 7 5	2 3	26.1
Buff Rock	1,670	236 1 3	2 4	27.1
All Breeds ..	91,038	12,689 13 12	2 4	26.8

TABLE V.
Number and Percentage of Special, First and under First Grade Eggs for each Breed in respect of Birds which completed the full 46-week Period.

Breed	Eggs Laid			Percentage Distribution		
	Special Grade	First Grade	Under First Grade	Special Grade	First Grade	Under First Grade
				%	%	%
White Wyandotte ..	13,148	8,293	1,537	57.2	36.1	6.7
Rhode Island Red ..	25,102	14,136	3,192	59.2	33.3	7.5
White Leghorn ..	4,778	3.922	662	51.0	41.9	7.1
Light Sussex	4,227	4,670	1,122	42.2	46.6	11.2
Buff Rock	1,024	574	58	61.8	34.7	3.5
All Breeds ..	48,274	31,595	6,571	55.8	36.6	7.6

TABLE VI.

Number and Percentage of Birds which laid 200 Special and First Grade Eggs or over, and not more than twenty per cent. under First Grade.

BREED	Number of Birds for full Period	Number of Birds which laid 200 Special and First Grade Eggs or over	Percentage
			%
White Wyandotte	123	38	30.9
Rhode Island Red	238	43	18.1
White Leghorn	57	5	8.8
Light Sussex	62	5	8.1
Buff Rock	11	—	—
All Breeds	491	91	18.5

TABLE VII.

Number and Percentage of Birds which laid over 169 but less than 200 Special and First Grade Eggs and not more than 20 per cent. under First Grade. The figures are based on the number of birds which completed the Test.

BREED	Number of Birds	Percentage
		%
White Wyandotte	38	30.9
Rhode Island Red	87	36.6
White Leghorn	16	28.1
Light Sussex	10	16.1
Buff Rock	1	9.1
All Breeds	152	31.0

Table VIII.

Egg Records of Birds which were awarded Copper Rings.

White Wyandotte (36 Birds).

Pen Number	Bird Number	Number of Sealed Copper Ring	Eggs Laid: Special Grade	Eggs Laid: First Grade	Eggs Laid: Under First Grade	Eggs Laid: Total	Name and Address of Owner
3	2	2759	184	18	2	204	Mrs. M. Stanton, Woodlands, Glanmire, Co. Cork.
4	11	2760	110	92	23	225	Mrs. M. Stanton, Woodlands, Glanmire, Co. Cork.
7	25	2761	138	66	2	206	Sister-in-Charge, St. Martha's College, An Uaimh, Co. Meath.
	26	2762	116	87	6	209	
	27	2763	220	31	—	251	
	28	2764	137	109	11	257	
	30	2765	209	11	—	220	
10	48	2766	183	25	3	211	Miss B. Quain, Anglesboro *via* Mitchelstown, Co. Limerick.
11	51	2767	210	1	2	213	Sister-in-Charge, School of Domestic Science, Dunmanway, Co. Cork.
	53	2768	210	4	—	214	
12	57	2769	112	103	7	222	Mrs. M. J. Smith, Colmanstown, Ballinasloe, Co. Galway.
	59	2770	203	15	1	219	
13	64	2771	87	117	10	214	Mrs. M. J. Smith, Colmanstown, Ballinasloe, Co. Galway.
15	74	2773	35	169	33	237	Mrs. M. Gammons, Ladyrath, Wilkinstown, An Uaimh, Co. Meath.
	75	2774	188	40	—	228	
	76	2775	124	89	6	219	
	77	2776	186	27	1	214	
16	79	2777	77	129	21	227	Miss J. Caslin, Newtowncashel, Co. Longford.
19	139	2778	190	58	1	249	Mrs. K. Graham, Ballagh Lodge, Donadea, Co. Kildare.
	141	2779	133	95	5	233	
	142	2780	170	41	4	215	
	143	2781	167	33	8	208	
	144	2782	151	49	1	201	

Pen Number	Bird Number	Number of Sealed Copper Ring	Eggs Laid				Name and Address of Owner
			Special Grade	First Grade	Under First Grade	Total	
21	98 101 102	2783 2784 2785	54 198 157	170 10 45	8 1 —	232 209 202	Mrs. M. Connolly, Carrickamore, Corvalley P.O., Co. Monaghan.
22	104 107	2786 2787	131 136	104 79	3 —	238 215	Mrs. L. O'Reilly, Rodstown, Balrath, Ceanannus Mór, Co. Meath.
23	110	2788	196	38		234	Mrs. K. Ryan, Farnane, Lisnagry, Co. Limerick.
24	116 117 120	2789 2790 2791	180 149 45	31 55 173	1 3 32	212 207 250	Mrs. W. Coleman, Banada, Ballaghaderreen, Co. Roscommon.
25	121 123 126	2792 2793 2794	87 57 192	123 152 17	28 24 1	238 233 210	Mrs. B. Coughlan, Ruane, Eyrecourt, Ballinasloe, Co. Galway.
26	128	2795	128	97	5	230	Mrs. C. Monahan, Toor Cottage, Ballinabrackey, Hill-of-Down, Co. Meath.

Rhode Island Red (35 Birds).

Pen Number	Bird Number	Number of Sealed Copper Ring	Eggs Laid				Name and Address of Owner
			Special Grade	First Grade	Under First Grade	Total	
29	149	2796	187	21	5	213	Mrs. O. Hodgins, Roselawn, Cloughjordan, Co. Tipperary.
31	162	2797	118	115	5	238	Mr. M. Fitzgibbon, Gurrane, Kilmeedy, Co. Limerick.
33	171 172 173	2798 2799 2800	52 182 149	177 23 52	15 — —	244 205 201	Mrs. M. K. Murphy, Gurranes, Timoleague, Co. Cork.
35	186	2801	131	95	1	227	Rev. Bro. Dominick, Agricultural College, Mount Bellew, Co. Galway.

Pen Number	Bird Number	Number of Sealed Copper Ring	Eggs Laid: Special Grade	First Grade	Under First Grade	Total	Name and Address of Owner
36	188 191	2802 2803	217 110	43 120	3 4	263 234	Mrs. E. O'Donnell, Kilbreedy West, Kilmallock, Co. Limerick.
37	194 196	2804 2805	34 147	168 79	3 1	205 227	Mrs. B. McAuliffe, Farrihy, Broadford, Charleville, Co. Limerick.
38	200 202	2806 2807	72 191	150 19	2 —	224 210	Sister-in-Charge, St. Martha's College, An Uaimh, Co. Meath.
39	206 207 210	2808 2809 2810	128 143 215	95 67 6	— 4 -	223 214 221	Miss M. O'Donovan, Dromore, Villierstown, Cappoquin, Co. Waterford.
40	211 215	2811 2812	171 47	47 171	— 17	218 235	Mrs. P. B. Roche, Rockview, Tullow, Co. Carlow.
47	259 262	2813 2814	145 132	75 78	2 3	222 213	Miss M. J. Weston, Ballymadrough, Donabate, Co. Dublin.
48	333	2815	137	98	4	239	Mrs. M. C. McCormack, Bawnogues Poultry Farm, Kilcock, Co. Kildare.
50	229 233	2816 2817	74 192	139 38	15 1	228 231	Mrs. B. Keane, Kilfera House, Kilkee, Co. Clare.
51	395	2818	210	9	—	219	Miss M. J. Weston, Ballymadrough, Donabate, Co. Dublin.
54	288	2819	136	65	3	204	Mrs. M. A. Kelly, Carronstown, Ballivor, Co. Meath.
58	309	2820	199	2	—	201	Mrs, M. J. Doyle Carrigeen, Baltinglass, Co. Wicklow.
59	313	2821	190	11	—	201	Mrs. E. O'Donnell, Kilbreedy West, Kilmallock, Co. Limerick.

Pen Number	Bird Number	Number of Sealed Copper Ring	Eggs Laid: Special Grade	First Grade	Under First Grade	Total	Name and Address of Owner
60	324	2823	219	2	—	221	Mrs. B. McAuliffe, Farrihy, Broadford, Charleville, Co. Limerick.
79	344 345	2824 2825	162 43	61 172	– 25	223 240	Mrs. M. O'Reilly, St. Johnsfort, Ardee, Co. Meath.
80	354	2826	221	8	2	231	Mrs. M. F. Smith, Bridge House, Bettystown, Co. Meath.
81	356	2827	194	15		209	Mrs. E. Hammersley, Ashvale, Lattin, Tipperary.
82	361	2828	182	47	-	229	Mr. W. Murphy, Skeeter Park, Cleariestown, Co. Wexford.
84	376 378	2829 2831	213 206	16 6	–	229 212	Miss M. Mulcahy, Abbeyview, Clonmel, Co. Tipperary.
102	384	2832	104	102	2	208	Mrs. B. M. Rafter, Knockthomas, Bagenalstown Co. Carlow.

White Leghorn (5 Birds).

Pen Number	Bird Number	Number of Sealed Copper Ring	Eggs Laid: Special Grade	First Grade	Under First Grade	Total	Name and Address of Owner
88	564	1838	198	15	1	214	Mrs. M. O'Shea, Farrantane, Castlegregory, Co. Kerry.
97	609 611	1839 1840	94 165	114 39	5 2	213 206	Mrs. L. Forster, Tattybrack, Rockcorry, Co. Monaghan.
98	622 628	1841 1842	185 116	20 100	— 11	205 227	Mrs. P. Walton, Ashtown Lodge, Castleknock, Co. Dublin.

Light Sussex (4 Birds).

Pen Number	Bird Number	Number of Sealed Copper Ring	Eggs Laid: Special Grade	Eggs Laid: First Grade	Eggs Laid: Under First Grade	Eggs Laid: Total	Name and Address of Owner
113	439	2834	62	183	6	251	Miss M. Daly, Knockglass, Moynalty, Ceanannus Mór, Co. Meath.
116	457	2835	45	182	16	243	Mrs. J. Hely-Hutchinson, Lissen Hall, Swords, Co. Dublin.
	459	2836	61	172	11	244	
	462	2837	33	171	9	213	

Table IX.

Results of post-mortem examinations performed by the Veterinary College.

Date of Death	Number of Bird	Number of Pen	Breed	Results of Post-mortem Examination
1945				
Oct. 27	184	35	Rhode Island Red	Neuro-lymphomatosis.
Nov. 19	305	57	Rhode Island Red	Aspergillosis
,, 19	584	93	White Leghorn	Ascarid and tapeworm infestations.
Dec. 8	610	97	White Leghorn	Prolapse of the bowel
,, 17	574	91	White Leghorn	Enteritis.
1946				
Jan. 4	92	18	White Wyandotte	Tapeworm infestation and atrophy of the liver.
,, 5	328	61	Rhode Island Red	Leukaemia.
,, 10	472	118	Buff Rock	Lymphomatosis of the ovary.
,, 14	23	6	White Wyandotte	Lymphomatosis of the ovary.
,, 14	413	108	Light Sussex	Capillaria worm infestation.
,, 14	576	91	White Leghorn	Neuro-lymphomatosis.
,, 18	16	5	White Wyandotte	Peritonitis.
,, 24	249	46	Rhode Island Red	Nephritis.
,, 24	542	90	White Leghorn	Lymphomatosis of the ovary.
,, 25	590	94	White Leghorn	Lymphomatosis of the ovary.
Feb. 4	572	91	White Leghorn	Neuro-lymphomatosis.
,, 9	595	95	White Leghorn	Lymphomatosis.
,, 11	43	10	White Wyandotte	Tuberculosis.
,, 11	47	10	White Wyandotte	Visceral gout and tuberculosis.
,, 23	37	9	White Wyandotte	Tuberculosis.
Mar. 4	38	9	White Wyandotte	Tuberculosis.
,, 4	409	108	Light Sussex	Lymphomatosis of the ovary.
,, 19	571	91	White Leghorn	Neuro-lymphomatosis and ascarid worm infestation.
,, 21	605	96	White Leghorn	Peritonitis.
,, 25	22	6	White Wyandotte	Lymphomatosis.
,, 25	410	108	Light Sussex	Lymphomatosis.
,, 30	94	18	White Wyandotte	Neuro-lymphomatosis.
April 1	95	18	White Wyandotte	Lymphomatosis of the ovary.
,, 2	70	14	White Wyandotte	General debility.
,, 8	247	46	Rhode Island Red	Necrosis of the liver.
,, 23	490	28	Rhode Island Red	Peritonitis.
,, 26	295	56	Rhode Island Red	Tuberculosis.
,, 27	39	9	White Wyandotte	Tuberculosis.
,, 29	42	9	White Wyandotte	Visceral gout.
May 4	197	37	Rhode Island Red	Haemangiomata.
,, 6	351	80	Rhode Island Red	Congestion of the lungs.
,, 9	390	103	Rhode Island Red	Tuberculosis.
,, 13	371	83	Rhode Island Red	Peritonitis.
,, 17	383	102	Rhode Island Red	Peritonitis.
,, 20	34	8	White Wyandotte	Rupture of a blood tumour.
,, 27	579	92	White Leghorn	Peritonitis.
,, 27	411	108	Light Sussex	Nephritis.
,, 28	67	14	White Wyandotte	Peritonitis.
,, 31	20	6	White Wyandotte	Enteritis.

TABLE IX.—*continued.*

Date of Death	Number of Bird	Number of Pen	Breed	Results of Post-mortem Examination
June 8	559	88	White Leghorn	Peritonitis.
,, 15	557	87	White Leghorn	Peritonitis.
,, 21	45	10	White Wyandotte	Rupture of a fatty liver.
,, 24	280	53	Rhode Island Red	Peritonitis.
July 1	69	14	White Wyandotte	Peritonitis and oviductitis.
,, 1	72	14	White Wyandotte	General debility
,, 19	153	30	Rhode Island Red	Peritonitis.
,, 20	374	84	Rhode Island Red	Peritonitis and oviductitis.
,, 22	582	92	White Leghorn	Neuro-lymphomatosis.
,, 25	5	3	White Wyandotte	Tuberculosis.
,, 25	9	4	White Wyandotte	Peritonitis.
,, 25	263	47	Rhode Island Red	Peritonitis.
Aug. 6	546	90	White Leghorn	Tapeworm infestation.
,, 6	380	102	Rhode Island Red	Acute congestion of the lungs.
,, 7	228	42	Rhode Island Red	Peritonitis.
,, 7	389	103	Rhode Island Red	Tuberculosis.
,, 15	329	61	Rhode Island Red	Peritonitis.

Table X.

Number and Percentage of Deaths for each Breed.

Breed	Number of Birds Penned	Number of Deaths	Percentage of Deaths
			%
White Wyandotte	144	21	14.6
Rhode Island Red	258	20	7.8
White Leghorn	72	15	20.8
Light Sussex	66	4	6.1
Buff Rock	12	1	8.3
All Breeds	552	61	11.1

SECTION PRIZES.

Section I—White Wyandotte.

	Owner of Pen	Scoring Points	Special and First Grade Scoring Eggs
First Prize (£10) :	Sister-in-Charge, St. Martha's College, An Uaimh, Co. Meath.	3,162	1,306
Second Prize (£7) :	Mrs. M. J. Smith, Colmanstown, Ballinasloe, Co. Galway.	2,727	1,123
Third Prize (£5) :	Sister-in-Charge, School of Domestic Science, Dunmanway, Co. Cork.	2,687	1,103
Fourth Prize (£4) :	Mrs. M. Stanton, Woodlands, Glanmire, Co. Cork.	2,573	1,090
Fifth Prize (£2) :	Mrs. M. Stanton, Woodlands, Glanmire, Co. Cork.	2,474	1,029

Section II—White Wyandotte (Station Holders).

	Owner of Pen	Scoring Points	Special and First Grade Scoring Eggs
First Prize (£10) :	Mrs. K. Graham, Ballagh Lodge, Donadea, Co. Kildare.	2,993	1,245
Second Prize (£7) :	Mrs. M. Gammons, Ladyrath, Wilkinstown, An Uaimh, Co. Meath.	2,905	1,195
Third Prize (£5) :	Mrs. K. Ryan, Farnane, Lisnagry, Co. Limerick.	2,654	1,101
Fourth Prize (£4) :	Mrs. W. Coleman, Banada, Ballaghaderreen, Co. Roscommon.	2,588	1,073
Fifth Prize (£2) :	Mrs. B. Coughlan, Ruane, Eyrecourt, Ballinasloe, Co. Galway.	2,577	1,053

Section III—Rhode Island Red.

	Owner of Pen	Scoring Points	Special and First Grade Scoring Eggs
First Prize (£10) :	Mrs. E. O'Donnell, Kilbreedy West, Kilmallock, Co. Limerick.	2,927	1,225
Second Prize (£7) :	Sister-in-Charge, St. Martha's College, An Uaimh, Co. Meath.	2,718	1,125
Third Prize (£5) :	Mrs. M. K. Murphy, Gurranes, Timoleague, Co. Cork.	2,647	1,110
Fourth Prize (£4) :	Miss M. O'Donovan, Dromore, Villierstown, Cappoquin, Co. Waterford.	2,590	1,084
Fifth Prize (£2) :	Miss M. J. Weston, Ballymadrough, Donabate, Co. Dublin.	2,544	1,067

Section IV—Rhode Island Red (Station Holders).

	Owner of Pen	Scoring Points	Special and First Grade Scoring Eggs
First Prize (£10) :	Mrs. M. J. Doyle, Carrigeen, Baltinglass, Co. Wicklow.	2,816	1,167
Second Prize (£7) :	Miss M. Mulcahy, Abbey View, Clonmel, Co. Tipperary.	2,667	1,118
Third Prize (£5) :	Mrs. B. McAuliffe, Farrihy, Broadford, (via Charleville), Co. Limerick	2,560	1,058
Fourth Prize (£4) :	Mrs. M. O'Reilly, St. Johnsfort, (via Ardee), Co. Meath.	2,555	1,071
Fifth Prize (£2) :	Miss M. J. Weston, Ballymadrough, Donabate, Co. Dublin.	2,552	1,075

Section V—Any Non-Sitting Breed.

	Owner of Pen	Breed	Scoring Points	Special and First Grade Scoring Eggs
First Prize (£10) :	Mrs. M. O'Shea, Farrantane, Castlegregory, Co. Kerry.	White Leghorn	2,434	1,006
Second Prize (£7) :	Mrs. P. Walton, Ashtown Lodge, Castleknock, Co. Dublin.	do.	2,423	1,020
Third Prize (£5) :	Mrs. L. Forster, Tattybrack, Rockcorry, Co. Monaghan.	do.	2,266	989
Fourth Prize (£4) :	Rev. Bro. Dominick, Agricultural College, Mountbellew, Co. Galway.	do.	2,172	932

Section VI—Any Other Utility Breed.

	Owner of Pen	Breed	Scoring Points	Special and First Grade Scoring Eggs
First Prize (£10) :	Mrs. J. Hely-Hutchinson, Lissen Hall, Swords, Co. Dublin.	Light Sussex	2,740	1,154

SPECIAL PRIZES.

The Special Prize of a Silver Cup (or its value, £10) for the *Pen* of birds scoring the highest number of points during the Test has been awarded to Sister-in-Charge, St. Martha's College, An Uaimh, Co. Meath, for Pen No. 7 (White Wyandotte) which scored 3,162 points.

Special Prizes of £2 each have been awarded to the following owners :—

1. Mrs. B. McAuliffe, Farrihy, Broadford, via Charleville, Co. Limerick, for the sitting breed, Pen No. 60 (Rhode Island Red) which scored 867 points during the period 1st October to 23rd December.

2. Mrs. P. Walton, Ashtown Lodge, Castleknock, Co. Dublin, for the non-sitting breed, Pen No. 98 (White Leghorn) which scored 648 points during the period 1st October to 23rd December.

3. Mrs. E. O'Donnell, Kilbreedy West, Kilmallock, Co. Limerick, for the *individual* sitting breed bird, No. 188 (Pen No. 36, Rhode Island Red) which scored 642 points during the test.

4. Mrs. P. Walton, Ashtown Lodge, Castleknock, Co. Dublin, for the *individual* non-sitting breed bird, No. 623 (Pen No. 98, White Leghorn) which scored 529 points during the test.

5. Mrs. K. Ryan, Farnane, Lisnagry, Co. Limerick, for the *individual* sitting breed bird, No. 110 (Pen 23, White Wyandotte) which scored 216 points during the period 1st October to 23rd December.

6. Mrs. P. Walton, Ashtown Lodge, Castleknock, Co. Dublin, for the *individual* non-sitting breed bird, No. 623 (Pen 98, White Leghorn) which scored 156 points during the period 1st October to 23rd December.

SECTION I.—WHITE WYANDOTTE—12 Pens.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1945	No. of Bird	Weight: On Arrival (lb. oz.)	Weight: At Close of Test (lb. oz.)	Production per Period: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First-Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs (oz. dr.)	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
1	7	Sister-in-Charge	Jan. 9	25	5 0	6 6	23	20	20	14	19	16	22	18	14	17	16	7	206	138	66	2	1	61	183	506	2 4	—	(a) 1,331 Eggs
		St. Martha's College,	,, 18	26	4 9	5 4	18	8	—	18	20	21	23	25	21	23	21	11	209	116	87	6	—	22	66	483	2 4	—	
		An Uaimh,	Feb. 1	27	5 0	6 14	15	19	20	20	21	21	26	25	24	25	24	11	251	220	31	—	1	54	162	614	2 5	—	(b) 27.1 oz.
		Co. Meath.	Jan. 18	28	4 12	5 4	23	19	18	18	21	20	25	26	23	24	28	12	257	137	109	11	2	60	180	601	2 3	—	
			,,	29	4 8	5 4	—	—	17	19	19	21	25	23	22	18	15	9	188	112	76	—	1	17	51	432	2 4	—	(c) 3,162 Points
			,,	30	4 14	6 0	19	20	20	20	21	22	22	23	23	4	16	10	220	209	11	—	1	59	177	526	2 5	1	
2	12	Mrs. M. J. Smith,	Feb. 1	55	4 14	6 12	—	8	20	18	17	17	19	21	14	20	18	9	181	152	28	1	—	27	81	434	2 5	—	(a) 1,244 Eggs
		Colmanstown,	,, 10	56	5 4	6 1	16	21	20	18	20	19	20	21	19	21	16	9	220	10	180	30	—	34	102	459	2 1	—	
		Ballinasloe,	,,	57	4 9	5 2	21	18	19	17	19	18	20	22	22	19	19	8	222	112	103	7	1	51	153	524	2 3	—	(b) 26.1 oz.
		Co. Galway.	,,	58	4 8	5 0	21	20	19	16	18	18	19	17	5	20	16	11	200	66	91	43	—	21	63	378	2 2	—	
			Feb. 1	59	5 4	7 0	19	20	18	19	17	17	24	21	22	19	14	9	219	203	15	1	1	56	168	532	2 5	—	(c) 2,727 Points
			,,	60	4 10	5 8	17	13	19	15	18	20	24	11	20	15	19	11	202	10	155	37	—	29	87	400	2 1	1	
3	11	Sister-in-Charge,	Feb. 3	49	5 0	6 0	18	20	22	22	20	20	22	21	21	21	17	9	233	28	144	61	1	12	36	400	2 1	—	(a) 1,306 Eggs
		School of Dom. Science,	,,	50	4 12	5 6	18	21	21	3	19	22	23	23	13	20	21	8	212	21	166	25	—	48	144	471	2 1	—	
		Dunmanway,	,,	51	4 14	7 0	20	21	19	19	20	18	19	21	18	16	14	8	213	210	1	2	—	58	174	518	2 7	—	(b) 26.9 oz.
		Co. Cork.	,,	52	4 10	5 8	15	18	14	17	17	18	21	19	19	20	19	8	205	49	134	22	4	28	84	431	2 2	—	
			,,	53	5 6	7 2	25	18	21	16	18	21	20	21	23	13	15	3	214	210	4	—	3	64	192	517	2 7	—	(c) 2,687 Points
			,,	54	4 9	6 2	4	21	23	21	21	21	24	23	21	20	20	10	229	188	40	1	84	47	141	350	2 5	—	
4	3	Mrs. M. Stanton,	Feb. 6	1	6 8	7 4	—	2	20	21	20	20	24	24	25	23	16	—	195	194	1	—	—	22	66	451	2 8	—	(a) 1,094 Eggs
		Woodlands,	,,	2	6 11	7 10	20	16	17	17	16	17	22	19	20	18	14	8	204	184	18	2	—	51	153	495	2 6	—	
		Glanmire,	Jan. 1	3	6 10	7 6	—	—	—	18	20	19	23	22	20	18	21	11	172	137	35	—	—	—	—	394	2 5	—	(b) 28.7 oz.
		Co. Cork.	—	4	6 14	7 11	13	22	21	11	18	19	17	7	5	9	—	1	143	143	—	—	—	56	168	352	2 8	—	
			Feb. 6	5	6 13	D	1	20	20	19	17	21	20	26	22	16	D	—	182	169	13	—	—	41	123	421	2 5	—	(c) 2,573 Points
			,,	6	6 14	8 1	20	4	—	12	23	22	25	25	21	22	15	9	198	190	6	2	—	22	66	460	2 6	—	
5	4	Mrs. M. Stanton,	Mar. 20	7	6 4	7 8	16	22	20	15	15	19	19	24	20	2	14	11	197	154	41	2	1	56	168	471	2 5	—	(a) 1,088 Eggs
		Woodlands,	,, 12	8	6 2	7 12	2	15	11	13	6	10	15	22	11	18	10	4	137	47	80	10	2	19	57	301	2 3	—	
		Glanmire,	,, 26	9	5 13	D	3	22	21	18	21	22	22	23	22	20	D2	—	196	95	99	2	2	44	132	450	2 3	1	(b) 26.9 oz.
		Co. Cork.	,, 12	10	6 2	6 14	17	3	12	14	—	16	19	18	18	12	15	7	151	41	102	8	—	24	72	344	2 2	—	
			,, 26	11	5 11	6 12	22	20	16	16	19	18	19	24	21	22	20	8	225	110	92	23	—	35	105	489	2 3	—	(c) 2,474 Points
			,, ,,	12	6 3	7 9	8	10	22	18	19	16	15	22	16	16	19	1	182	172	10	—	9	40	117	419	2 8	—	

D = Dead.

SECTION I.—WHITE WYANDOTTE—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1945	No. of Bird	Weight: On Arrival lb. oz.	Weight: At Close of Test lb. oz.	Production per Period: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First-Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs oz. dr.	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
6	8	Miss V. Burdon,	Feb. 22	31	5 14	6 6	17	16	19	14	17	19	20	21	22	9	18	9	201	80	115	6	3	46	138	464	2 3	—	(a) 1,001 Eggs
		The Laurels,	„	32	5 12	6 11	16	18	17	20	18	17	18	16	14	15	16	5	190	70	117	3	—	48	144	458	2 3	—	
		Buttevant,	„	33	5 10	6 11	—	—	4	18	19	21	20	19	20	17	15	8	161	147	14	—	—	4	12	366	2 6	—	(b) 26.9 oz.
		Co. Cork.	„	34	6 0	D	8	—	8	20	22	20	25	24	D6	—	—	—	133	30	99	4	—	14	42	272	2 3	—	
			„	35	5 8	6 7	—	—	—	7	20	17	20	19	22	18	18	8	149	114	34	1	1	—	—	337	2 5	—	(c) 2,302 Points
			„	36	5 10	6 4	—	5	19	19	17	15	20	16	9	15	21	11	167	106	61	—	—	24	72	405	2 4	1	
7	5	Miss U. Roche,	March	13	4 14	6 9	—	—	9	10	11	17	21	19	21	21	19	9	157	81	73	3	—	6	18	363	2 4	—	(a) 979 Eggs
		Creevaghbeg,	„	14	4 8	7 0	—	—	—	7	21	22	25	22	27	25	19	11	179	171	7	1	2	—	—	407	2 7	—	
		Ballymahon,	February	15	5 14	6 10	5	—	3	—	9	20	23	13	25	21	20	8	147	106	36	5	—	3	9	336	2 5	1	(b) 27.0 oz.
		Mullingar,	March	16	4 12	D	19	20	22	d16	—	—	—	—	—	—	—	—	77	2	36	39	—	24	72	100	1 15	—	
		Co. Westmeath.	„	17	4 8	5 9	22	22	23	20	21	21	23	22	23	11	20	3	231	68	123	40	—	28	84	443	2 2	—	(c) 2,087 Points
			„	18	4 10	5 2	23	6	9	21	21	12	23	23	12	15	15	8	188	148	37	3	2	35	105	438	2 5	4	
8	13	Mrs. M. J. Smith,	Feb. 10	61	5 0	5 14	21	21	17	22	16	18	24	25	17	13	23	3	220	10	163	47	—	27	81	404	2 1	1	(a) 1,029 Eggs
		Colmanstown,	„	62	4 8	5 9	—	—	17	18	—	17	22	23	20	22	22	9	170	1	129	40	—	14	42	308	2 0	—	
		Ballinasloe,	„	63	5 4	6 9	19	15	18	11	—	10	18	20	15	21	22	8	177	124	51	2	1	52	156	451	2 4	—	(b) 25.5 oz.
		Co. Galway.	„	64	5 0	6 5	7	3	16	18	21	21	25	24	22	25	23	9	214	87	117	10	5	17	51	468	2 3	—	
			„	65	5 0	7 0	12	12	2	13	13	12	12	14	11	6	5	4	116	83	32	1	3	25	75	263	2 6	—	(c) 2,010 Points
			„	66	4 8	5 3	—	—	5	23	5	23	11	19	15	16	12	3	132	1	49	82	—	4	12	116	1 15	3	
9	14	Mr. B. H. Roberts,	Jan. 14	67	6 2	D	21	16	11	—	4	20	23	15	D3	—	—	—	113	109	4	—	6	48	144	262	2 7	—	(a) 752 Eggs
		Ballyanna,	Feb. 13	68	6 2	7 0	22	6	—	18	27	23	26	13	18	18	11	14	196	141	55	—	—	28	84	463	2 4	3	
		Ballycotton,	Jan. 14	69	6 9	D	21	19	11	—	—	12	23	25	9	D	—	—	120	37	70	13	—	51	153	265	2 2	—	(b) 27.8 oz.
		Co. Cork.	„	70	6 14	D	5	20	11	5	16	4	D3	—	—	—	—	—	64	53	11	—	1	36	108	162	2 6	—	
			„	71	6 10	5 5	11	16	9	—	6	18	17	15	13	2	—	—	107	105	2	—	11	36	105	227	2 9	—	(c) 1,752 Points
			Feb. 26	72	5 11	D	24	23	22	19	18	21	19	6	—	D	—	—	152	130	22	—	—	69	207	373	2 4	—	
10	10	Miss B. Quain,	March 7	43	4 12	D	3	20	15	—	D	—	—	—	—	—	—	—	38	37	1	—	—	38	114	114	2 9	—	(a) 735 Eggs
		Anglesboro,	„	44	4 10	7 8	—	—	4	14	10	14	14	13	18	12	12	1	112	108	4	—	2	4	12	249	2 9	—	
		Mitchelstown,	„	45	4 12	D	2	24	18	19	18	18	20	6	—	D	—	—	125	89	31	5	—	40	120	280	2 4	—	(b) 27.9 oz.
		(Co. Limerick).	„	46	4 8	6 7	—	23	19	18	17	18	21	23	20	12	18	8	197	101	77	19	2	24	72	413	2 3	—	
			„	47	4 15	D	19	21	12	—	D	—	—	—	—	—	—	—	52	21	28	3	—	49	147	147	2 2	—	(c) 1,707 points
			„	48	5 2	6 15	13	22	22	17	19	20	19	17	20	16	18	8	211	183	25	3	3	54	162	504	2 7	—	

D = Dead.

SECTION I.—WHITE WYANDOTTE—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1945	No. of Bird	Weight: On Arrival lb. oz.	Weight: At Close of Test lb. oz.	Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Scoring Points: Full Period	Average Weight of Eggs oz. dr.	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
11	9	Miss B. Quain,	Feb. 11	37	6 2	D	24	18	20	17	15	D	—	—	—	—	—	—	94	63	28	3	—	62	186	244	2 3	—	(a) 738 Eggs
		Anglesboro,	,,	38	5 2	D	22	19	19	5	—	D	—	—	—	—	—	—	65	38	25	2	—	58	174	185	2 3	—	
		Mitchelstown	,,	39	5 11	D	23	18	21	10	—	10	10	D2	—	—	—	—	94	51	32	11	—	62	186	228	2 2	—	(b) 25.3 oz.
		(Co. Limerick).	,,	40	5 0	7 12	—	16	14	15	22	20	16	9	19	6	6	2	145	50	86	9	6	22	66	295	2 3	—	
			,,	41	5 4	5 4	21	16	18	20	20	22	23	25	22	19	16	1	223	9	128	86	—	15	45	300	2 0	—	(c) 1,514 Points
			,,	42	5 12	D	22	21	21	9	—	22	22	D	—	—	—	—	117	29	75	13	—	54	162	262	2 2	—	
12	6	Mr. V. E. H. Bewley,	Feb. 1	19	5 8	4 9	—	6	16	6	—	—	—	16	15	—	—	—	59	9	46	4	4	21	51	119	2 2	—	(a) 446 Eggs
		Danum Firs,	,, 27	20	4 12	D	—	—	—	—	—	—	9	18	D1	—	—	—	28	3	19	6	1	—	—	42	2 1	—	
		Rathgar,	March 10	21	4 8	5 13	—	—	—	8	15	17	21	18	14	21	21	10	145	98	46	1	2	—	—	334	2 4	—	(b) 26.7 oz.
		Dublin.	,,	22	6 0	D	—	—	5	19	3	—	D	—	—	—	—	—	27	25	2	—	—	5	15	59	2 7	—	
			Feb. 13	23	5 4	D	—	—	—	D	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	(c) 1,022 Points
			,,	24	6 6	6 15	22	20	17	16	5	14	20	15	13	19	17	9	187	137	47	3	2	59	177	468	2 4	—	

D = Dead.

SECTION II.—WHITE WYANDOTTE (STATION HOLDERS)—12 Pens.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1945	No. of Bird	Weight: On Arrival lb. oz.	Weight: At Close of Test lb. oz.	Production per Period: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs oz. dr.	Number of times Broody	(a) Total Eggs from Pen (b) Average Weight per dozen. (c) Scoring Points per Pen.
1	19	Mrs. K. Graham, Ballagh Lodge, Donadea, Co. Kildare.	Feb. 16	139	4 10	6 2	20	21	22	20	20	22	26	23	21	23	20	11	249	190	58	1	1	62	186	610	2 4	—	(a) 1,280 Eggs
			,,	140	4 14	6 2	4	—	—	17	21	22	23	24	19	19	20	10	179	60	115	4	—	—	—	399	2 3	—	
			,,	141	5 1	5 14	—	22	21	22	19	22	25	20	25	24	22	11	233	133	95	5	3	38	114	543	2 4	—	(b) 27.0 oz.
			March 14	142	4 8	5 14	1	21	21	20	23	21	20	19	22	18	19	10	215	170	41	4	12	39	117	476	2 5	—	
			Feb. 16	143	4 10	6 2	20	25	16	19	19	15	18	18	15	16	14	8	203	167	33	3	1	60	180	496	2 5	—	(c) 2,993 Points
			,,	144	4 12	6 8	—	12	24	19	21	20	23	25	23	18	13	3	201	151	49	1	—	35	105	469	2 4	—	
2	15	Mrs. M. Gammons, Ladyrath, Wilkinstown, An Uaimh, Co. Meath.	Feb. 10	73	5 0	5 12	11	19	18	18	18	22	21	20	22	20	14	4	207	124	75	8	4	40	120	466	2 3	—	(a) 1,278 Eggs
			,,	74	5 4	6 6	16	20	20	19	22	23	25	26	25	22	8	11	237	35	169	33	1	38	111	481	2 2	—	
			,,	75	5 8	6 0	17	17	23	19	24	22	17	19	16	23	23	8	228	188	40	—	13	57	171	534	2 5	—	(b) 26.8 oz.
			,,	76	5 3	6 14	20	20	18	15	22	22	24	19	20	17	15	7	219	124	89	6	—	53	159	518	2 3	—	
			,,	77	5 6	6 10	17	15	17	18	16	19	23	20	20	20	18	11	214	186	27	1	2	48	144	518	2 5	—	(c) 2,905 Points
			,,	78	5 4	7 0	11	20	2	16	6	19	17	17	15	20	15	10	168	144	21	3	7	30	87	388	2 6	—	
3	23	Mrs. K. Ryan, Farnane, Lisnagry, Co. Limerick.	Feb. 20	109	4 8	5 10	—	7	20	16	18	19	19	22	19	19	18	5	182	178	4	—	2	27	81	429	2 7	—	(a) 1,108 Eggs
			,,	110	4 14	5 0	27	25	20	20	16	18	19	20	19	20	20	10	234	196	38	—	—	72	216	590	2 4	—	
			,,	111	4 14	6 6	1	16	24	21	22	20	22	8	17	12	20	2	185	110	75	—	—	41	123	445	2 4	1	(b) 28.5 oz.
			,,	112	4 8	5 8	—	—	—	—	13	20	20	19	20	20	19	10	141	139	1	1	—	—	—	329	2 8	—	
			,,	113	5 0	6 8	—	—	13	18	20	22	23	24	20	20	20	8	188	184	4	—	1	13	39	435	2 6	—	(c) 2,654 Points
			,,	114	4 10	5 2	7	17	19	13	16	16	20	18	19	16	16	1	178	176	2	—	3	43	129	426	2 8	—	
4	24	Mrs. W. Coleman, Banada, Ballaghaderreen, Co. Roscommon.	March 5	115	4 8	5 5	—	15	23	19	22	18	22	22	9	11	18	2	181	10	120	51	—	16	48	305	2 0	1	(a) 1,171 Eggs
			Jan. 5	116	4 15	5 12	20	18	18	20	20	21	26	19	10	10	19	11	212	180	31	1	1	56	165	515	2 5	1	
			,, 13	117	4 8	6 13	17	17	21	21	19	20	21	23	11	13	15	9	207	149	55	3	1	52	156	494	2 4	—	(b) 26.3 oz.
			,, 5	118	5 0	6 2	—	—	—	1	23	23	24	9	13	11	8	13	125	80	42	3	1	—	—	270	2 4	2	
			,, ,,	119	4 9	5 12	—	16	18	16	20	11	21	20	20	24	20	10	196	141	53	2	—	33	99	475	2 4	—	(c) 2,588 Points
			,, ,,	120	4 8	6 0	21	21	22	23	19	22	23	18	25	22	25	9	250	45	173	32	3	53	159	529	2 1	—	
5	25	Mrs. B. Coughlan, Ruane, Eyrecourt, Ballinasloe, Co. Galway.	Feb. 21	121	5 5	8 2	21	22	25	20	22	19	20	21	22	18	20	8	238	87	123	28	2	44	132	504	2 2	—	(a) 1,221 Eggs
			,,	122	5 2	6 14	21	18	19	13	8	9	10	4	—	3	—	3	108	59	45	4	—	55	165	269	2 3	—	
			,,	123	4 10	5 0	19	21	20	21	17	19	22	21	25	21	17	10	233	57	132	24	13	39	117	470	2 2	—	(b) 26.2 oz.
			,,	124	5 1	6 2	22	23	25	24	25	25	23	21	18	17	15	10	248	6	177	65	6	29	87	412	2 0	—	
			,,	125	5 7	7 0	20	16	21	16	18	7	9	18	20	14	20	5	184	137	44	3	22	57	171	404	2 5	—	(c) 2,677 Points
			,,	126	5 4	6 12	19	20	18	19	21	15	21	19	14	20	18	6	210	192	17	1	—	56	168	518	2 6	—	

SECTION II.—WHITE WYANDOTTE (STATION HOLDERS)—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1945	No. of Bird	Weight: On Arrival (lb. oz.)	Weight: At Close of Test (lb. oz.)	Production per Period: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs (oz. dr.)	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
6	22	Mrs. L. O'Reilly,	Feb. 1	103	4 9	5 6	—	—	9	5	20	14	15	13	16	—	14	7	113	109	4	—	—	9	27	256	2 8	1	(a) 1,101 Eggs
		Rodstown,	„	104	5 4	6 4	27	24	19	17	19	20	20	27	23	22	9	11	238	131	104	3	1	69	207	578	2 4	—	
		Balrath,	„	105	5 0	5 10	—	10	19	19	20	16	23	20	17	23	18	8	193	135	56	2	1	28	84	456	2 4	—	(b) 27.0 oz.
		Ceanannus Mór,	„	106	5 1	6 2	—	1	21	17	20	17	19	18	8	7	11	4	143	142	1	—	1	22	66	327	2 7	—	
		Co. Meath.	„	107	5 0	5 14	—	9	20	20	21	23	22	24	24	20	22	10	215	136	79	—	1	29	87	508	2 4	—	(c) 2,499 Points
			„	108	4 11	5 10	—	—	12	18	22	25	26	28	25	19	16	8	199	11	156	32	—	11	33	374	2 1	—	
7	26	Mrs. C. Monahan,	Jan. 20	127	4 12	4 11	17	17	16	14	18	17	21	22	20	18	16	7	203	200	2	1	56	49	144	362	2 7	—	(a) 1,096 Eggs
		Toor Cottage,	„	128	4 8	5 10	15	14	22	20	23	17	23	23	23	21	20	9	230	128	97	5	—	46	138	546	2 4	—	
		Ballinabrackey,	„	129	4 8	5 14	16	18	17	17	19	20	20	17	—	18	12	9	183	121	59	3	—	50	150	447	2 4	2	(b) 27.6 oz.
		Hill-of-Down,	„	130	4 12	7 3	3	17	10	15	18	17	17	17	21	15	15	7	172	171	1	—	1	30	87	408	2 10	—	
		Co. Meath.	„	131	4 8	5 6	21	8	—	—	4	19	24	15	15	20	7	12	145	6	109	30	—	14	42	278	2 1	1	(c) 2,430 Points
			„	132	4 8	5 8	12	18	17	14	22	18	18	11	12	10	7	4	163	101	60	2	—	47	141	389	2 4	3	
8	21	Mrs. M. Connolly,	February	97	5 7	7 4	18	21	20	14	19	17	18	16	8	7	—	—	158	114	44	—	1	59	177	380	2 4	—	(a) 1,048 Eggs
		Carrigamore,	„	98	5 0	5 13	21	20	17	18	18	21	20	24	22	20	20	11	232	54	170	8	2	51	153	544	2 2	—	
		Corvalley P.O.,	„	99	6 0	7 10	—	—	3	14	15	9	10	6	5	8	7	—	77	62	15	—	20	3	9	125	2 6	—	(b) 26.9 oz.
		(Co. Monaghan).	„	100	4 10	6 4	—	17	16	15	20	19	23	11	16	18	8	7	170	48	109	13	1	25	75	369	2 2	1	
			„	101	5 0	7 4	10	19	17	18	19	17	22	21	20	16	19	11	209	198	10	1	1	45	135	505	2 6	—	(c) 2,398 Points
			„	102	5 0	7 0	—	2	24	19	22	21	26	23	20	18	17	10	202	157	45	—	—	26	78	475	2 5	—	
9	16	Miss J. Caslin,	March 1	79	4 8	5 8	19	19	21	18	18	18	21	18	23	22	20	10	227	77	129	21	1	38	114	499	2 2	—	(a) 1,118 Eggs
		Newtowncashel,	„	80	4 8	6 13	24	21	19	21	19	18	20	16	15	9	5	1	188	130	51	7	1	57	171	432	2 4	—	
		Co. Longford.	„	81	4 8	6 3	21	17	—	12	20	16	24	22	21	21	20	8	202	75	122	5	1	35	105	475	2 3	—	(b) 25.7 oz.
			„	82	4 8	6 0	16	17	17	8	9	18	20	21	22	22	22	10	202	11	155	36	—	25	75	408	2 1	—	
			„	83	5 1	6 6	13	14	15	9	12	18	19	20	16	16	21	9	182	121	51	10	—	32	96	422	2 4	—	(c) 2,286 Points
			„	84	4 9	5 9	19	16	20	18	24	20	—	—	—	—	—	—	117	—	23	94	—	4	12	50	1 14	—	
10	27	Mr. W. Barron,	Jan. 12	133	5 7	6 9	14	1	3	3	15	16	18	22	22	23	18	10	165	—	9	156	—	4	12	22	1 13	—	(a) 1,134 Eggs
		Woodview P. F.,	„	134	5 0	6 2	—	11	21	18	21	23	24	23	21	22	19	8	211	4	157	50	—	15	45	384	2 0	—	
		Gurtrush,	„	135	5 7	6 14	21	23	24	20	20	17	22	20	2	—	18	12	199	58	130	11	—	63	189	465	2 2	—	(b) 25.1 oz.
		Piltown,	„	136	5 13	7 2	19	17	17	14	13	15	20	19	19	18	19	8	198	156	42	—	—	53	159	494	2 4	—	
		Co. Kilkenny.	„	137	5 4	6 6	—	—	8	19	20	18	19	15	19	18	17	10	163	8	140	15	—	7	21	346	2 1	—	(c) 2,156 Points
			„	138	5 8	7 2	20	23	16	14	16	17	18	18	17	13	19	7	198	90	100	8	11	54	162	445	2 3	—	

SECTION II.—WHITE WYANDOTTE (STATION HOLDERS)—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1945	No. of Bird	Weight: On Arrival (lb. oz.)	Weight: At Close of Test (lb. oz.)	Production per Period: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs (oz. dr.)	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen (c) Scoring Points per Pen.
11	17	Mrs. U. Duffy,	March	85	4 10	6 14	—	5	22	21	21	17	26	19	20	10	10	10	181	178	3	—	5	27	81	409	2 7	—	(a) 954 Eggs
		Ballyscarvin,	,,	86	4 14	5 10	—	—	5	23	26	7	17	15	14	14	13	3	137	50	82	5	1	5	15	297	2 3	2	
		Moate,	,,	87	4 10	5 3	18	6	—	17	19	24	22	13	16	10	7	12	164	22	120	22	—	4	12	317	2 2	1	(b) 26.7 oz.
		Co. Westmeath.	,,	88	4 9	6 10	—	—	—	1	23	21	21	14	9	10	5	—	104	66	37	1	—	—	—	221	2 4	—	
			,,	89	5 1	5 14	3	—	7	20	26	21	27	26	25	26	24	11	216	22	176	18	—	4	12	453	2 1	—	(c) 2,033 Points
			,,	90	4 12	6 4	—	16	21	18	16	17	22	23	18	1	—	—	152	122	28	2	—	35	105	336	2 5	—	
12	18	Miss K. Devery,	March 6	91	5 11	5 8	8	—	—	1	14	15	11	13	12	16	3	—	93	79	11	3	41	5	15	113	2 8	—	(a) 549 Eggs
		Cappagh,	,,	92	4 14	D	16	7	—	D	—	—	—	—	—	—	—	—	23	1	13	9	—	14	42	42	1 15	—	
		Ballinahown	,,	93	4 8	5 0	20	20	19	6	19	19	18	18	16	3	—	—	158	17	122	19	—	49	147	329	2 1	—	(b) 26.5 oz.
		Athlone,	,,	94	4 15	D	18	16	18	18	16	1	D	—	—	—	—	—	87	11	53	23	—	34	102	162	2 0	—	
		(Offaly).	,,	95	5 0	D	8	8	2	6	7	—	D	—	—	—	—	—	31	5	17	9	1	10	30	52	2 0	—	(c) 1,052 Points
			,,	96	4 8	5 4	17	14	17	14	14	13	11	16	18	1	16	6	157	139	16	2	12	46	138	354	2 6	1	

D = Dead.

SECTION III.—RHODE ISLAND RED—20 Pens.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1945	No. of Bird	Weight: On Arrival lb. oz.	Weight: At Close of Test lb. oz	Production per Period: Oct. 1-Oct. 28	Oct. 29-Nov. 25	Nov. 26-Dec. 23	Dec. 24-Jan. 20	Jan. 21-Feb. 17	Feb. 18-Mar. 17	Mar. 18-Apl. 14	Apl. 15-May 12	May 13-June 9	June 10-July 7	July 8-Aug. 4	Aug. 5-Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring Special and First Grade	Special and First Grade—Oct. 1-Dec. 23	Scoring Points: Oct. 1-Dec. 23	Full Period	Average Weight of Eggs oz. dr.	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
1	36	Mrs. E. O'Donnell,	February	187	5 12	6 10	13	—	12	22	24	24	23	21	13	18	12	12	194	156	38	—	—	25	75	465	2 5	2	(a) 1,252 Eggs
		Kilbreedy West,	March	188	5 0	6 2	18	24	22	21	22	19	26	24	26	25	25	11	263	217	43	3	—	61	183	642	2 5	—	(b) 27.3 oz.
		Kilmallock,	„	189	5 14	5 8	—	15	19	19	20	18	22	20	20	15	18	8	194	138	54	2	2	32	96	452	2 4	—	(c) 2,927 Points
		Co. Limerick.	„	190	5 0	6 9	—	17	22	19	19	19	23	17	15	12	14	2	179	124	54	1	13	38	111	386	2 4	—	
			„	191	5 0	6 1	8	20	18	20	20	21	24	26	22	24	20	11	234	110	120	4	2	43	129	553	2 3	—	
			February	192	5 5	6 5	—	—	15	16	15	18	24	25	23	21	22	9	188	174	14	—	—	15	45	439	2 6	—	
2	38	Sister-in-Charge,	Jan. 13	199	4 8	5 0	26	19	16	15	14	18	22	26	23	23	22	8	232	56	139	37	1	61	183	487	2 1	—	(a) 1,178 Eggs
		St. Martha's College,	„	200	4 8	5 5	18	19	22	17	20	20	22	20	19	24	17	6	224	72	150	2	2	58	174	543	2 3	—	(b) 26.9 oz.
		An Uaimh,	„	201	4 13	6 14	—	14	21	19	17	20	22	22	17	22	20	9	203	55	144	4	—	33	99	481	2 3	—	(c) 2,718 Points
		Co. Meath.	„	202	4 8	6 13	4	20	23	23	21	23	23	25	22	2	21	3	210	191	19	—	2	47	141	487	2 6	1	
			„	203	4 8	5 12	—	—	17	22	19	19	19	21	23	20	18	9	187	185	2	—	—	17	51	438	2 8	—	
			„	204	4 8	5 8	15	11	—	—	4	15	22	16	13	10	13	3	122	54	63	5	—	23	69	282	2 3	2	
3	33	Mrs. M. K. Murphy,	Feb. 10	169	5 4	6 10	15	18	19	19	16	18	20	21	16	16	14	—	192	162	30	—	—	52	156	466	2 5	—	(a) 1,127 Eggs
		Gurranes,	„	170	5 4	5 11	—	—	—	12	19	21	22	26	25	22	24	2	173	70	102	1	—	—	—	392	2 3	—	(b) 26.4 oz.
		Timoleague,	„	171	5 12	6 12	22	20	23	22	23	18	23	26	21	23	15	8	244	52	177	15	—	63	189	566	2 2	—	(c) 2,647 Points
		Co. Cork.	„	172	5 2	6 0	19	16	19	20	12	13	23	20	21	19	16	7	205	182	23	—	1	54	162	503	2 4	—	
			„	173	5 4	5 5	13	15	18	18	10	20	20	24	22	19	17	5	201	149	52	—	—	46	138	489	2 4	—	
			„	174	5 3	5 13	—	—	—	5	16	16	23	22	23	7	—	—	112	14	98	—	—	—	—	231	2 3	—	
4	39	Miss M. O'Donovan,	January	205	5 2	5 14	10	15	19	10	18	8	18	21	9	4	—	—	132	131	1	—	2	44	132	307	2 8	—	(a) 1,089 Eggs
		Dromore,	„	206	5 0	6 10	12	17	17	22	19	21	26	21	21	22	17	8	223	128	95	—	1	46	138	536	2 4	—	(b) 28.4 oz.
		Villierstown,	March	207	5 13	6 9	19	20	10	—	16	24	24	25	23	22	20	11	214	143	67	4	2	46	138	513	2 4	—	(c) 2,590 Points
		Cappoquin,	February	208	5 12	6 15	10	—	—	14	22	23	22	24	23	22	18	7	185	174	11	—	5	10	30	414	2 6	—	
		Co. Waterford.	March	209	4 14	6 12	—	—	—	—	8	22	24	23	6	22	8	11	124	120	4	—	—	—	—	289	2 9	2	
			January	210	5 12	6 10	17	22	2	17	23	20	28	24	17	24	20	7	221	215	6	—	1	41	123	531	2 8	—	
5	47	Miss M. J. Weston,	April 5	259	5 4	6 0	7	20	21	21	15	19	24	17	25	22	22	9	222	145	75	2	—	48	144	540	2 4	—	(a) 1,076 Eggs
		Ballymadrough,	March	260	5 8	6 8	15	17	18	15	12	6	21	22	22	20	19	11	198	196	2	—	—	50	150	496	2 8	—	(b) 28.0 oz.
		Donabate,	„	261	5 4	6 12	—	—	7	5	9	20	23	24	22	20	19	9	158	142	16	—	—	7	21	371	2 5	—	(c) 2,544 Points
		Co. Dublin.	„	262	5 4	5 10	19	9	—	22	22	22	23	24	23	22	19	8	213	132	78	3	1	25	75	491	2 4	—	
			„	263	5 4	D	—	—	—	6	22	23	23	7	17	2	D	—	100	56	42	2	1	—	—	195	2 4	2	
			„	264	5 15	7 10	1	16	17	13	14	16	24	17	20	16	22	9	185	181	4	—	—	34	102	451	2 7	—	

D = Dead.

SECTION III —RHODE ISLAND RED—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1945	No. of Bird	Weight: On Arrival lb. oz.	Weight: At Close of Test lb. oz.	Production per Period: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs oz. dr.	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
6	34	Mr. D. H. Edwards,	Jan. 23	175	6 0	6 14	18	18	20	15	15	3	19	21	19	21	18	9	196	191	5	—	1	56	168	493	2 7	—	(a) 1,015 Eggs
		Drumgowan,	„	176	5 12	7 13	7	—	—	12	18	16	23	25	25	24	22	9	181	51	125	5	2	5	15	407	2 3	—	
		Burt,	„	177	5 10	7 8	7	—	4	18	19	17	19	18	22	21	22	9	176	175	1	—	—	11	33	415	2 8	—	(b) 27.6 oz.
		Speenogue P.O.,	„	178	5 12	7 6	23	18	—	1	19	9	6	8	5	4	4	1	98	85	13	—	—	41	123	246	2 5	2	
		Co. Donegal.	Feb. 15	179	5 11	6 9	—	7	17	15	20	19	23	22	16	11	16	—	166	119	46	1	—	24	72	381	2 4	2	(c) 2,423 Points
			„	180	5 9	7 0	15	14	7	16	12	18	23	21	25	25	23	9	198	72	123	3	—	34	102	481	2 3	—	
7	45	Mrs. K. J. Earl,	March	241	5 2	7 12	—	—	—	14	23	22	25	26	20	15	16	10	171	166	5	—	1	—	—	380	2 6	—	(a) 1,085 Eggs
		Grantstown House,	„	242	5 4	8 0	—	1	18	16	6	—	21	20	13	5	4	4	108	108	—	—	1	19	57	246	2 10	—	
		Waterford.	„	243	5 4	6 12	16	14	—	3	18	22	25	22	15	12	15	12	174	166	8	—	—	30	90	417	2 6	2	(b) 28.9 oz.
			February	244	5 6	6 13	—	6	19	22	19	22	24	21	20	20	13	8	194	189	5	—	—	25	75	454	2 7	—	
			„	245	5 2	7 5	14	20	16	20	16	19	23	21	18	13	10	1	191	189	2	—	—	50	150	456	2 7	—	(c) 2,398 Points
			March	246	4 14	5 4	—	—	1	21	22	23	26	27	27	27	22	1	197	172	25	—	—	1	3	445	2 5	—	
8	41	Mrs. D. Philpott,	March	217	6 4	6 8	—	—	18	21	21	25	23	25	12	23	5	10	183	57	124	2	1	17	51	414	2 3	1	(a) 1,005 Eggs
		Charlesfield,	„	218	6 7	8 5	22	22	22	21	6	2	24	25	23	11	—	—	178	124	53	1	—	65	195	430	2 4	—	
		Banteer,	„	219	6 10	6 14	15	—	—	16	21	22	24	24	21	21	20	10	194	163	30	1	—	14	42	451	2 5	—	(b) 27.6 oz.
		Co. Cork.	„	220	6 4	7 5	—	2	20	19	16	20	20	11	8	5	—	—	121	69	50	2	3	20	60	256	2 4	—	
			„	221	7 3	7 3	24	20	—	—	2	25	28	23	24	11	12	5	174	162	11	1	1	43	129	415	2 6	—	(c) 2,328 Points
			„	222	7 2	8 0	—	—	8	19	15	1	22	21	20	21	17	11	155	150	4	1	1	8	24	362	2 8	—	
9	43	Sister-in-Charge,	March 17	265	5 10	7 5	15	2	—	13	19	19	22	20	25	24	22	11	192	155	28	9	—	9	27	432	2 4	—	(a) 1,079 Eggs
		Irishane Convent,	„	266	5 8	5 13	15	—	—	10	14	9	17	19	17	18	17	10	146	118	28	—	—	15	45	352	2 5	—	
		Millstreet,	„	267	5 0	6 0	20	14	16	21	18	20	18	19	17	20	18	9	210	153	54	3	5	49	144	496	2 4	—	(b) 26.0 oz.
		Co. Cork.	„	268	4 11	6 1	16	16	21	18	14	17	21	20	19	11	—	—	173	85	82	6	3	48	138	385	2 3	—	
			„	269	5 0	6 9	12	21	20	9	—	18	10	18	17	14	15	—	154	16	107	31	1	30	90	300	2 1	2	(c) 2,216 Points
			„	270	4 10	5 11	—	8	20	20	22	22	25	24	16	22	17	8	204	2	106	96	—	12	36	251	2 0	—	
10	40	Mrs. P. B Roche,	March 1	211	5 4	6 8	19	21	21	19	22	19	23	22	13	18	15	6	218	171	47	—	4	61	183	524	2 4	—	(a) 1,198 Eggs
		Rockview,	„	212	5 3	5 9	17	—	3	19	19	19	24	23	25	22	19	8	198	180	18	—	—	20	60	465	2 5	—	
		Tullow,	„	213	5 2	5 11	5	14	24	21	24	23	24	10	11	21	14	2	193	7	58	128	2	22	66	158	1 15	—	(b) 25.4 oz.
		Co. Carlow.	„	214	4 14	5 8	5	12	7	14	22	28	26	23	21	17	17	11	203	3	61	139	—	8	24	154	1 15	—	
			„	215	5 4	6 4	23	21	23	22	22	20	22	24	17	17	12	12	235	47	171	17	—	60	180	534	2 2	1	(c) 2,166 Points
			„	216	5 4	5 15	11	2	14	21	18	12	18	16	19	9	7	4	151	20	124	7	1	26	78	331	2 2	1	

SECTION III.—RHODE ISLAND RED—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1945	No. of Bird	Weight: On Arrival lb. oz.	Weight: At Close of Test lb. oz.	Production per Period: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs oz. dr.	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
11	31	Mr. M. Fitzgibbon,	March 20	157	5 14	5 12	—	—	11	20	19	21	20	24	25	19	19	10	188	12	167	9	2	11	27	408	2 1	—	(a) 1,054 Eggs
		Gurrane,	,,	158	5 14	6 8	14	14	3	—	11	24	20	17	15	13	12	—	143	49	78	16	—	23	69	301	2 3	4	
		Kilmeedy,	,,	159	5 4	6 5	22	17	19	12	—	8	27	28	26	23	20	13	215	6	137	72	—	37	111	356	2 0	—	(b) 25.3 oz.
		Co. Limerick.	,,	160	6 2	7 7	—	—	2	7	3	14	18	25	21	7	15	8	120	10	97	13	—	1	3	239	2 1	—	
			,,	161	6 12	7 11	20	5	7	16	15	20	21	14	15	16	1	—	150	23	110	17	6	22	66	290	2 1	—	(c) 2,161 Points
			,,	162	5 12	7 0	20	21	17	19	21	19	23	27	22	24	18	7	238	118	115	5	1	54	162	567	2 3	—	
12	37	Mrs. B. McAuliffe,	Feb. 1	193	4 8	5 14	19	19	—	8	11	15	20	15	16	10	6	—	139	3	94	42	—	19	57	226	2 0	—	(a) 1,000 Eggs
		Farrihy,	,,	194	4 9	6 0	—	18	21	20	21	22	20	23	20	15	17	8	205	34	168	3	1	38	114	480	2 2	—	
		Broadford,	,,	195	4 11	5 14	—	10	4	15	18	21	23	26	24	20	23	9	193	7	173	13	—	12	36	422	2 1	—	(b) 25.4 oz.
		Charleville,	,,	196	5 4	6 0	16	19	15	18	20	23	23	22	22	21	19	9	227	147	79	1	2	50	150	545	2 4	—	
		(Co. Limerick).	,,	197	4 12	D	—	10	19	17	20	7	6	D4	—	—	—	—	83	5	60	18	—	20	60	150	2 1	—	(c) 2,144 Points
			,,	198	4 13	6 8	—	4	17	21	19	18	15	16	14	8	14	7	153	33	106	14	1	16	48	321	2 2	—	
13	35	Rev. Bro. Dominick,	March	181	5 6	6 4	—	—	13	17	19	19	19	16	20	18	14	6	161	26	120	15	1	9	27	332	2 2	—	(a) 945 Eggs
		Agricultural College,	,,	182	6 2	6 11	20	20	11	10	12	19	17	18	21	11	19	8	186	168	18	—	—	51	153	461	2 6	1	
		Mountbellew,	,,	183	4 10	5 13	—	15	14	9	5	13	17	16	22	18	15	7	151	40	104	7	—	28	84	354	2 2	—	(b) 26.2 oz.
		Co. Galway.	,,	184	4 12	D	D	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
			,,	185	4 10	5 4	12	—	13	20	24	23	23	27	27	24	21	6	220	18	156	46	2	25	75	406	2 1	—	(c) 2,110 Points
			,,	186	6 8	6 14	20	19	21	18	18	18	22	23	22	19	18	9	227	131	95	1	—	59	177	557	2 4	—	
14	32	Mrs. K. Cuddihy,	Feb. 15	481	6 1	7 12	12	—	17	18	21	17	22	20	14	19	18	11	189	153	35	1	—	28	84	452	2 5	—	(a) 852 Eggs
		Hillside Poultry Farm,	,,	482	5 13	6 14	14	20	24	21	19	18	13	16	13	18	12	8	196	142	53	1	3	58	174	477	2 4	—	
		Glenmore,	,,	483	5 12	7 8	—	15	8	9	5	6	2	7	—	—	—	—	52	40	12	—	1	23	69	125	2 4	—	(b) 28.0 oz.
		Co. Kilkenny.	,,	484	6 12	8 2	13	18	18	3	6	10	13	7	5	—	—	—	93	89	3	1	1	48	144	230	2 6	—	
			,,	485	6 1	7 1	—	2	20	19	21	16	16	18	17	15	14	—	158	156	2	—	2	22	66	361	2 7	—	(c) 2,018 Points
			,,	486	5 10	6 5	11	—	3	17	17	21	19	17	17	18	16	8	164	158	6	—	4	14	42	373	2 6	—	
15	44	Mrs. F. McLoughlin,	Feb. 15	235	4 10	5 11	–	–	–	18	21	23	23	20	24	20	21	8	178	31	141	6	—	—	—	391	2 2	—	(a) 882 Eggs
		Tierernane Lodge,	,,	236	5 9	7 10	12	15	16	14	17	13	9	–	–	–	–	–	96	89	7	—	—	43	129	235	2 6	—	
		Ballickmoyler,	,,	237	5 7	6 15	21	19	17	19	17	14	18	16	4	5	–	–	150	134	16	—	—	57	171	362	2 6	—	(b) 28.2 oz.
		Laoighis.	,,	238	5 12	6 8	–	–	14	17	15	16	19	21	18	12	12	5	149	144	5	—	2	14	42	335	2 8	—	
			,,	239	5 12	6 1	17	18	19	16	17	15	21	14	15	10	14	6	182	180	2	—	14	54	162	413	2 7	—	(c) 2,002 Points
			,,	240	6 2	7 6	18	15	11	12	12	17	20	9	13	–	–	–	127	118	8	1	13	48	120	266	2 6	—	

D = Dead.

SECTION III.—RHODE ISLAND RED—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1945	No. of Bird	Weight On Arrival lb. oz	Weight At Close of Test lb. oz.	Oct. 1-Oct. 28	Oct. 29-Nov. 25	Nov. 26-Dec 23	Dec. 24-Jan. 20	Jan. 21-Feb. 17	Feb. 18-Mar. 17	Mar. 18-Apl. 14	Apl. 15-May 12	May 13-June 9	June 10-July 7	July 8-Aug. 4	Aug 5-Aug. 18	Total	Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First Grade	Special and First Grade—Oct. 1-Dec. 23	Scoring Points Oct. 1-Dec. 23	Scoring Points Full Period	Average Weight of Eggs	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen
16	28	Mrs L. Farrell,	March 15	487	5 0	7 10	14	17	23	21	18	20	21	17	15	12	10	—	188	175	12	1	12	53	150	422	2 6	—	(a) 973 Eggs
		Stanley Lodge,	,,	488	4 10	6 10	—	—	10	15	18	15	20	20	17	8	17	8	148	24	111	13	2	8	24	304	2 2	—	
		Cashel,	,,	489	4 8	5 11	11	25	22	15	19	20	25	18	21	19	16	4	215	58	129	28	12	41	123	423	2 2	—	(b) 26.1 oz.
		Co. Tipperary.	,,	490	4 15	D	23	24	24	19	17	19	22	D4	—	—	—	—	152	13	103	36	—	39	117	271	2 0	—	
			,,	491	4 10	5 2	24	21	21	17	15	1	2	2	1	—	—	—	104	3	38	63	2	15	45	93	2 2	—	(c) 1,904 Points
			,,	492	4 8	7 1	—	8	21	21	17	23	16	16	6	12	15	11	166	143	22	1	2	29	87	391	2 5	—	
17	29	Mrs. O. Hodgins,	Feb. 22	145	5 3	6 2	9	23	21	21	12	17	24	24	22	18	18	9	218	3	46	160	—	6	18	114	1 14	—	(a) 1,117 Eggs
		Rose Lawn,	,,	146	4 9	6 6	2	16	—	—	17	16	16	24	24	18	14	10	157	33	101	23	2	8	24	310	2 2	—	
		Cloughjordan,	,,	147	4 8	6 0	—	16	23	19	6	17	22	26	28	27	22	10	216	—	41	175	—	8	24	94	1 14	—	(b) 25.4 oz.
		Co. Tipperary.	,,	148	4 10	7 3	—	9	11	16	12	9	17	21	22	18	16	8	159	152	6	1	1	19	57	374	2 6	—	
			,,	149	4 13	7 3	15	20	19	17	13	12	20	24	22	21	21	9	213	187	21	5	2	49	147	510	2 5	—	(c) 1,729 Points
			,,	150	4 11	7 4	—	6	—	9	13	14	23	22	17	21	19	10	154	87	62	5	8	4	12	327	2 4	—	
18	42	Sister-in-Charge,	February	223	5 0	7 1	—	15	21	1	—	—	—	—	—	—	—	—	37	11	25	1	—	35	105	107	2 2	—	(a) 741 Eggs
		School of Dom. Science,	,,	224	4 11	6 8	23	23	23	19	20	17	10	11	6	3	—	—	155	105	39	11	3	59	177	344	2 4	—	
		Dunmanway,	,,	225	5 0	6 0	18	13	—	6	26	22	25	25	17	2	—	6	160	107	52	1	1	30	90	354	2 4	—	(b) 26 2 oz.
		Co Cork.	,,	226	5 1	6 10	12	20	20	21	20	19	20	12	12	12	9	4	181	35	138	8	3	45	135	408	2 2	—	
			,,	227	5 0	6 12	13	21	24	22	23	17	20	6	8	7	4	—	165	91	64	10	1	49	147	368	2 3	—	(c) 1,675 Points
			,,	228	4 11	D	4	17	19	3	—	—	—	—	—	—	—	D	43	5	27	11	—	30	90	94	2 0	—	
19	30	Mr. M. Fitzgibbon,	Feb 26	151	6 2	6 10	—	7	18	18	9	11	23	20	18	15	21	—	160	8	84	68	1	10	30	216	2 0	—	(a) 971 Eggs
		Gurrane,	,,	152	5 8	5 5	6	—	14	23	21	23	25	22	11	18	2	8	173	4	61	108	—	5	15	155	1 15	2	
		Kilmeedy,	,,	153	6 0	D	2	10	17	11	19	23	22	17	10	13	D1	—	145	110	33	2	—	27	81	327	2 5	—	(b) 25.3 oz.
		Co. Limerick.	,,	154	6 2	6 4	—	—	—	—	—	10	23	25	26	18	19	1	122	97	25	—	—	—	—	282	2 5	—	
			,,	155	6 8	6 3	18	14	—	4	20	21	24	26	21	21	11	1	181	79	95	7	—	32	96	413	2 3	—	(c) 1,606 Points
			,,	156	6 6	6 9	—	5	17	19	21	22	22	22	15	17	20	10	190	6	131	53	42	21	63	213	2 0	—	
20	46	Mrs. K. J. Earl,	March	247	5 4	D	14	7	—	—	5	1	D9	—	—	—	—	—	36	1	5	30	—	4	12	16	1 13	—	(a) 775 Eggs
		Grantstown House,	January	248	5 8	7 2	10	15	18	15	18	23	22	14	19	20	13	7	194	25	155	14	1	37	108	430	2 2	—	
		Waterford.	February	249	5 6	D	—	10	19	13	D	—	—	—	—	—	—	—	42	4	37	1	—	28	84	110	2 2	—	(b) 26.0 oz.
			,,	250	5 8	6 5	11	—	8	18	21	19	22	22	22	24	19	8	194	7	164	23	30	8	24	305	2 1	—	
			,,	251	5 19	6 0	8	10	3	15	22	15	24	25	22	16	14	6	180	165	15	—	—	21	63	417	2 7	—	(c) 1,555 Points
			January	252	5 6	6 4	5	4	6	6	8	20	18	17	16	9	11	9	129	50	71	8	3	14	42	277	2 3	1	

D = Dead

SECTION IV.—RHODE ISLAND RED (STATION HOLDERS)—28 Pens.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1945	No. of Bird	Weight: On Arrival (lb. oz.)	Weight: At Close of Test (lb. oz.)	Oct. 1-Oct. 28	Oct. 29-Nov. 25	Nov. 26-Dec. 23	Dec. 24-Jan. 20	Jan. 21-Feb. 17	Feb. 18-Mar. 17	Mar. 18-Apl. 14	Apl. 15-May 12	May 13-June 9	June 10-July 7	July 8-Aug. 4	Aug. 5-Aug. 18	Total	Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First Grade	Special and First Grade—Oct. 1-Dec. 23	Scoring Points: Oct. 1-Dec. 23	Scoring Points: Full Period	Average Weight of Eggs (oz dr.)	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
1	58	Mrs. M. J. Doyle,	Feb. 10	307	4 14	6 0	20	17	18	12	—	14	22	25	16	19	16	7	186	181	5	—	—	55	165	469	2 6	—	(a) 1,204 Eggs
		Carrigeen,	,, ,,	308	5 9	7 11	17	22	20	19	19	22	22	19	21	24	18	9	232	195	36	1	3	58	174	562	2 5	—	
		Baltinglass,	,, 3	309	5 4	6 14	—	—	17	22	20	17	25	22	27	22	24	5	201	199	2	—	1	17	51	467	2 8	—	(b) 27.8 oz.
		Co. Wicklow.	,, 10	310	5 0	7 2	—	2	21	21	20	19	18	23	20	16	15	3	178	23	150	5	—	21	63	401	2 2	—	
			,, ,,	311	4 11	5 8	16	15	18	17	18	16	22	20	15	12	6	9	184	79	82	23	4	28	84	366	2 3	—	(c) 2,816 Points
			,, 3	312	5 1	6 4	21	19	18	13	17	19	22	25	22	22	17	8	223	220	3	—	—	58	174	551	2 7	—	
2	84	Miss M. Mulcahy,	February	373	4 9	6 11	—	—	18	22	22	14	25	24	23	19	21	9	197	167	30	—	1	18	54	459	2 5	—	(a) 1,152 Eggs
		Abbey View,	Jan. 13	374	5 0	D	19	20	17	2	19	13	11	17	15	1	D	—	134	114	19	1	1	56	163	321	2 5	—	
		Clonmel,	,, 15	375	5 0	6 12	4	19	22	20	13	21	20	19	11	12	12	7	180	176	4	—	27	45	135	361	2 6	—	(b) 28.3 oz.
		(Co. Tipperary).	February	376	5 8	6 8	19	21	22	19	17	20	23	19	22	20	20	7	229	213	16	—	2	62	186	561	2 5	—	
			,,	377	4 8	6 2	—	1	19	24	21	23	23	28	21	16	19	5	200	196	3	1	—	19	57	457	2 7	—	(c) 2,667 Points
			,,	378	5 2	6 14	14	18	17	17	18	23	27	21	20	19	12	6	212	206	6	—	1	49	147	508	2 6	—	
3	60	Mrs. B. McAuliffe,	Feb. 1	319	5 1	7 8	17	16	19	21	20	19	15	10	17	7	8	5	174	95	76	3	27	51	150	350	2 3	—	(a) 1,203 Eggs
		Farrihy,	,,	320	5 10	7 6	18	20	20	14	20	25	22	12	18	7	11	8	205	3	106	96	3	26	78	262	1 15	—	
		Broadford,	,,	321	4 14	6 3	21	16	20	18	17	22	20	21	15	17	15	8	210	93	113	4	—	53	159	505	2 3	—	(b) 27.1 oz.
		Charleville,	,,	322	5 9	6 12	17	23	19	21	21	20	23	20	16	2	13	6	201	80	119	2	—	57	171	476	2 3	—	
		(Co. Limerick).	,,	323	5 10	7 14	8	21	21	21	21	22	17	22	16	5	12	6	192	164	22	6	1	44	132	437	2 5	—	(c) 2,560 Points
			,,	324	5 12	7 10	17	21	21	20	20	22	24	21	19	14	16	6	221	219	2	—	3	59	177	530	2 10	—	
4	70	Mrs. M. O'Reilly,	Jan. 29	343	5 5	6 13	20	22	15	21	23	23	21	20	11	1	7	7	191	76	103	12	3	45	135	410	2 3	—	(a) 1,120 Eggs
		St. Johnsfort,	,,	344	4 15	5 4	18	20	19	20	17	20	23	20	20	20	18	8	223	162	61	—	—	57	171	549	2 4	—	
		Ardee,	,,	345	4 12	5 9	15	20	18	22	16	21	25	26	22	24	22	9	240	43	172	25	—	51	153	520	2 1	—	(b) 26.8 oz.
		(Co. Meath).	,,	346	5 5	7 8	15	17	20	18	18	14	22	23	20	15	—	—	182	140	38	4	1	48	144	417	2 4	—	
			,,	347	4 15	5 7	23	20	8	3	19	22	23	13	18	10	9	6	174	163	10	1	1	51	153	420	2 6	1	(c) 2,555 Points
			,,	348	5 1	6 11	—	14	9	8	7	22	21	17	11	—	—	1	110	103	6	1	1	22	66	239	2 6	—	
5	51	Miss M. J. Weston,	March	391	6 14	7 3	—	—	14	20	22	19	21	24	22	23	22	9	196	195	1	—	—	14	42	460	2 10	—	(a) 1,090 Eggs
		Ballymadrough,	,,	392	6 4	7 11	11	19	18	5	5	22	21	20	16	17	10	9	173	166	6	1	11	48	144	396	2 7	—	
		Donabate	,,	393	5 12	7 0	11	—	—	—	20	24	10	23	13	16	20	10	147	134	11	2	1	9	27	342	2 7	2	(b) 29.3 oz.
		Co. Dublin.	,,	394	6 2	7 11	21	—	—	—	21	25	20	28	15	14	19	2	165	154	11	—	—	21	63	386	2 6	1	
			,,	395	5 12	6 11	18	23	23	17	19	21	19	23	18	11	17	10	219	210	9	—	—	64	192	540	2 7	—	(c) 2,552 Points
			,,	396	5 14	6 11	—	—	5	16	24	23	27	25	27	11	21	11	190	175	15	—	—	5	15	428	2 6	—	

D = Dead

SECTION IV.—RHODE ISLAND RED (STATION HOLDERS)—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1945	No. of Bird	Weight: On Arrival (lb. oz.)	Weight: At Close of Test (lb. oz.)	Production per Period: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs (oz. dr.)	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
6	53	B. Bean Mhic Dhomhnaill,	Feb. 18	277	4 8	5 3	16	25	22	17	20	17	19	18	15	16	16	10	211	120	69	22	1	41	123	458	2 3	—	(a) 1,171 Eggs
		Imeall-Atha,	”	278	4 8	7 4	—	9	16	18	17	21	23	21	20	22	16	10	193	36	154	3	3	25	75	442	2 2	—	
		Baile an Fheirteirigh,	”	279	4 8	6 3	—	—	—	—	7	19	21	19	22	9	16	10	123	83	39	1	24	—	—	214	2 5	—	(b) 26.2 oz.
		Co. Chiarraidhe.	Feb. 28	280	4 8	D	13	25	20	21	24	25	26	25	23	D10	—	—	212	77	130	5	—	54	162	478	2 3	—	
			” 18	281	4 8	6 3	—	2	21	22	25	27	22	21	24	25	23	12	224	69	148	7	2	23	69	507	2 3	—	(c) 2,552 Points
			” ”	282	4 8	7 2	—	—	15	21	27	25	23	25	24	22	18	8	208	73	127	8	4	25	75	453	2 3	—	
7	59	Mrs. E. O'Donnell,	February	313	5 8	7 5	19	19	17	11	3	12	23	26	22	21	21	7	201	190	11	—	1	55	165	504	2 6	—	(a) 1,036 Eggs
		Kilbreedy West,	”	314	5 8	7 0	—	—	11	20	18	20	21	25	22	21	19	9	186	93	91	2	1	10	30	425	2 4	—	
		Kilmallock,	”	315	5 9	7 12	—	—	14	21	[illegible]	23	23	22	14	15	20	10	183	96	85	2	7	12	36	401	2 4	—	(b) 27.9 oz.
		Co. Limerick.	”	316	5 4	6 5	—	4	17	15	20	19	21	22	20	15	9	6	168	166	2	—	5	21	63	374	2 7	1	
			”	317	5 4	6 9	15	19	15	16	1	10	21	11	11	14	20	10	163	142	19	2	5	48	144	402	2 5	—	(c) 2,400 Points
			”	318	5 10	6 6	—	—	4	17	16	18	20	20	17	14	7	2	135	127	8	—	1	4	12	294	2 6	—	
8	55	Mrs. M. K. Murphy,	Feb. 28	289	5 3	7 5	—	—	3	20	19	22	23	26	21	17	12	7	170	43	127	—	—	3	9	379	2 3	—	(a) 1,066 Eggs
		Gurranes,	”	290	5 12	6 9	—	2	23	17	20	16	18	19	19	20	17	7	178	154	23	1	—	24	72	422	2 5	—	
		Timoleague,	”	291	5 8	7 2	14	2	—	10	23	22	23	19	20	19	19	5	176	161	14	1	1	15	45	406	2 6	—	(b) 27.0 oz.
		Co. Cork.	”	292	5 8	6 8	—	—	—	16	19	20	22	23	20	19	21	9	169	168	1	—	—	—	—	387	2 7	—	
			”	293	5 4	7 8	17	24	24	20	22	22	19	18	14	9	11	5	205	55	127	23	1	43	129	429	2 2	—	(c) 2.377 Points
			”	294	5 5	7 3	9	24	23	21	22	23	23	13	7	3	—	—	168	29	126	13	2	46	138	354	2 2	—	
9	48	Mrs. M. C. McCormack,	February	331	6 4	7 10	19	15	15	3	3	19	20	21	19	19	16	8	177	64	99	14	—	36	108	404	2 2	—	(a) 1,198 Eggs
		Bawnogues P. F.,	”	332	6 3	7 8	—	—	15	16	19	20	20	19	14	—	14	9	146	146	—	—	1	15	45	328	2 9	—	
		Kilcock,	”	333	5 4	6 6	19	21	18	22	20	19	23	22	22	21	22	10	239	137	98	4	—	56	168	579	2 4	—	(b) 25.6 oz.
		Co. Kildare.	”	334	5 4	6 3	18	18	19	17	15	18	17	20	21	18	19	7	207	2	129	76	—	12	36	313	2 0	—	
			”	335	4 12	5 2	15	7	—	15	22	19	21	24	22	23	18	11	197	8	133	56	—	2	6	327	2 0	—	(c) 2,357 Points
			”	336	4 8	4 12	19	20	18	17	19	20	22	24	24	20	19	10	232	3	163	66	—	38	114	406	2 0	—	
10	82	Mr. W. Murphy,	Jan. 28	361	5 14	6 14	20	22	24	19	16	21	23	20	23	24	15	2	229	182	47	—	1	66	198	562	2 5	—	(a) 990 Eggs
		Skeeter Park,	”	362	5 15	5 15	—	8	17	16	9	17	21	15	14	17	19	8	161	156	5	—	—	25	75	391	2 7	—	
		Cleariestown,	”	363	5 15	6 15	—	6	19	20	16	20	22	25	18	11	22	4	183	175	7	1	—	25	75	425	2 7	1	(b) 28.4 oz.
		Co. Wexford.	”	364	5 14	7 4	—	3	22	18	19	19	25	21	16	—	—	—	143	139	4	—	—	25	75	311	2 6	—	
			”	365	5 14	7 11	14	—	—	22	20	22	4	4	—	—	—	—	86	43	39	4	—	10	30	174	2 4	—	(c) 2,308 Points
			”	366	5 14	7 0	19	19	18	20	17	17	22	14	18	12	12	—	188	174	14	—	4	56	168	445	2 7	—	

D = Dead

SECTION IV.—RHODE ISLAND RED (STATION HOLDERS)—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1945	No. of Bird	Weight: On Arrival (lb. oz.)	Weight: At Close of Test (lb. oz.)	Production: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs (oz. dr.)	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
11	56	Mrs. C. Healy,	Feb. 7	295	5 6	D	16	18	21	19	17	13	6	D	—	—	—	—	110	106	4	—	1	55	162	272	2 5	—	(a) 968 Eggs
		Clonmeen,	,,	296	5 4	6 6	—	15	15	10	6	22	18	22	18	18	19	7	170	159	11	—	—	30	90	414	2 6	—	
		Banteer,	,,	297	5 13	7 9	—	—	10	2	—	20	17	24	21	17	19	7	137	136	1	—	—	10	30	327	2 8	—	(b) 28.2 oz.
		Co. Cork.	,,	298	5 14	7 7	—	14	18	14	13	18	23	24	22	16	16	9	187	169	17	1	—	32	96	441	2 6	—	
			,,	299	5 6	6 2	—	15	21	15	18	19	17	25	15	21	9	2	177	175	2	—	7	36	108	406	2 6	—	(c) 2,284 Points
			,,	300	5 2	6 0	—	—	2	17	21	21	22	27	23	26	18	10	187	50	134	3	—	2	6	424	2 3	—	
12	54	Mrs. M. A. Kelly,	Feb. 2	283	4 10	5 9	20	20	7	—	19	18	23	26	27	20	18	9	207	6	130	71	1	15	45	325	2 0	—	(a) 1,214 Eggs
		Carranstown,	,,	284	5 0	5 14	1	19	18	20	21	23	25	25	23	23	6	—	204	4	111	89	2	28	84	262	1 15	—	
		Ballivor,	,,	285	4 9	5 13	—	11	23	21	20	23	18	26	23	23	20	9	217	24	166	27	1	33	99	446	2 1	—	(b) 25.2 oz.
		Co. Meath.	,,	286	4 14	5 8	18	20	21	6	3	25	25	23	20	12	17	6	196	3	120	73	—	46	138	314	1 15	2	
			,,	287	4 10	6 8	—	—	4	15	18	21	26	25	25	23	20	9	186	174	9	3	—	2	6	420	2 6	—	(c) 2,251 Points
			,,	288	4 12	6 5	23	21	21	21	20	21	22	18	18	18	1	—	204	136	65	3	—	63	189	484	2 4	—	
13	80	Mrs. M. F. Smith,	February	349	5 12	8 3	—	—	12	2	11	22	24	26	16	12	18	—	143	33	102	8	2	12	36	304	2 3	—	(a) 930 Eggs
		Bridge House,	March	350	5 10	6 3	—	9	19	11	—	8	19	20	19	13	18	12	148	52	91	5	—	27	81	355	2 3	1	
		Bettystown,	,,	351	5 0	D	7	9	21	9	—	13	20	D11	—	—	—	—	90	88	1	1	—	36	108	214	2 7	—	(b) 28.6 oz.
		Co. Meath.	,,	352	5 0	5 0	5	—	—	9	14	17	22	23	22	23	17	9	161	148	13	—	—	5	15	376	2 6	—	
			,,	353	5 9	6 12	7	9	2	14	2	15	25	23	20	23	17	6	163	163	—	—	1	18	54	387	2 11	—	(c) 2,179 Points
			,,	354	5 8	6 14	—	21	21	21	17	17	24	27	25	23	24	11	231	221	8	2	5	41	123	543	2 7	—	
14	57	Mr. D. H. Edwards,	Jan. 23	301	6 8	7 11	26	23	24	21	23	27	23	17	8	19	16	3	230	229	1	—	4	73	219	560	2 10	1	(a) 905 Eggs
		Drumgowan,	Feb. 15	302	5 0	5 12	19	18	19	20	17	21	19	22	19	12	—	5	191	151	39	1	3	55	165	444	2 4	—	
		Burt,	,,	303	5 3	6 7	16	15	17	9	1	19	20	20	18	22	24	8	189	86	101	2	1	48	144	473	2 3	—	(b) 28.6 oz.
		Speenogue P.O.,	Jan. 23	304	5 4	7 3	—	—	—	17	23	23	26	19	13	12	7	9	149	128	21	—	6	—	—	311	2 7	—	
		Co. Donegal.	,,	305	5 0	D	—	D	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	(c) 2,125 Points
			Feb. 15	306	5 2	7 3	19	6	—	4	15	19	23	15	19	14	5	7	146	139	6	1	2	25	75	337	2 6	2	
15	49	Capt. H. M. S. Redmond,	March 3	253	5 0	6 10	15	16	15	6	—	10	22	25	24	24	22	11	190	165	25	—	—	46	138	483	2 5	—	(a) 1,197 Eggs
		Popefield,	,,	254	4 8	6 0	6	20	18	—	9	22	25	21	25	21	20	12	199	12	130	57	—	2	6	338	2 0	—	
		Athy,	,,	255	4 8	5 6	21	15	14	16	17	16	23	22	23	23	18	11	219	45	141	33	—	18	54	442	2 2	—	(b) 25.5 oz.
		(Laoighis).	,,	256	4 8	5 0	—	1	20	20	19	23	26	26	24	24	18	10	211	—	4	207	—	1	3	10	1 12	—	
			,,	257	4 8	6 2	—	8	18	18	22	19	22	26	25	20	20	8	206	104	98	4	—	24	72	476	2 3	—	(c) 2,114 Points
			,,	258	4 8	6 5	—	—	—	15	27	22	28	22	17	18	16	7	172	164	8	—	7	—	—	365	2 7	—	

D = Dead

SECTION IV.—RHODE ISLAND RED (STATION HOLDERS)—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1945	No. of Bird	Weight: On Arrival (lb. oz.)	Weight: At Close of Test (lb. oz.)	Production per Period: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs (oz. dr.)	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
16	61	Miss M. O'Donovan,	January	325	6 0	7 10	—	5	12	21	15	14	22	12	13	14	15	5	148	138	10	—	2	17	51	342	2 8	—	(a) 910 Eggs
		Dromore,	February	326	5 7	7 12	19	21	20	20	20	18	20	16	16	2	4	2	178	166	12	—	—	60	180	424	2 7	—	
		Villierstown,	,,	327	5 6	6 11	15	5	17	17	16	18	23	20	22	17	—	5	175	118	51	6	5	31	87	379	2 4	—	(b) 27.9 oz.
		Cappoquin,	March	328	4 12	D	—	8	20	D4	—	—	—	—	—	—	—	—	32	—	18	14	—	15	45	51	1 15	—	
		Co. Waterford.	January	329	5 9	D	18	14	19	15	17	21	21	23	22	12	—	D	182	72	101	9	—	45	135	403	2 3	—	(c) 2,072 Points
			February	330	5 6	6 6	18	16	5	3	18	21	24	25	21	14	19	11	195	180	15	—	—	39	117	473	2 6	1	
17	81	Mrs. E. Hammersley,	Jan. 24	355	5 2	5 15	11	—	11	20	18	20	21	22	14	6	5	—	148	86	54	8	2	15	45	300	2 4	—	(a) 1,035 Eggs
		Ashvale,	,,	356	4 9	5 10	19	12	18	16	14	21	19	24	16	21	19	10	209	194	15	—	1	49	147	515	2 5	—	
		Lattin,	,,	357	4 14	7 9	15	18	16	11	17	20	24	17	18	13	11	3	183	143	37	3	12	48	144	407	2 4	—	(b) 26.3 oz.
		Tipperary.	,,	358	4 10	6 12	19	24	24	11	4	21	20	16	14	12	17	1	183	96	79	8	44	59	177	322	2 3	—	
			Feb. 6	359	4 8	5 5	11	16	22	19	18	21	20	19	19	12	12	8	197	8	134	55	27	16	48	256	2 0	—	(c) 2,058 Points
			,,	360	4 8	6 4	—	15	27	10	14	15	14	12	4	4	—	—	115	28	83	4	3	40	120	258	2 2	—	
18	52	Mrs. O. Hodgins,	Feb. 22	271	5 0	7 3	—	10	19	11	16	15	22	21	24	18	18	2	176	144	30	2	10	28	84	385	2 5	—	(a) 937 Eggs
		Rose Lawn,	,,	272	5 0	6 12	—	—	11	20	11	6	22	22	15	12	21	5	145	62	79	4	—	11	33	329	2 4	2	
		Cloughjordan,	,,	273	5 0	7 4	—	6	22	19	18	16	19	21	23	19	24	10	197	194	3	—	1	28	84	473	2 7	—	(b) 27.1 oz.
		Co. Tipperary.	,,	274	4 9	6 13	14	—	—	9	11	9	9	—	—	—	—	—	52	2	22	28	—	3	9	51	1 15	—	
			,,	275	4 10	6 4	—	—	14	19	21	19	20	23	13	15	17	9	170	77	90	3	4	11	33	376	2 4	—	(c) 2,047 Points
			,,	276	4 12	6 0	13	9	5	11	19	22	26	24	23	19	18	8	197	97	88	12	—	18	54	433	2 3	—	
19	102	Mrs. B. M. Rafter,	Feb. 13	379	4 10	5 0	23	19	14	17	20	21	22	24	25	18	21	10	234	3	109	122	16	20	60	231	1 15	—	(a) 1,107 Eggs
		Knockthomas,	,,	380	5 7	D	18	15	19	22	19	20	22	23	16	—	3	D	177	4	147	26	1	29	87	332	2 1	—	
		Bagenalstown,	,,	381	5 14	6 9	20	18	21	19	21	17	15	24	13	11	12	12	203	93	99	11	2	52	156	467	2 3	2	(b) 26.1 oz.
		Co Carlow.	,,	382	5 12	6 8	—	—	11	19	17	18	21	23	22	18	17	2	168	166	2	—	51	11	30	257	2 10	—	
			,,	383	4 12	D	15	19	17	20	16	18	12	—	D	—	—	—	117	17	87	13	—	43	129	251	2 1	—	(c) 2,045 Points
			,,	384	5 0	5 8	17	13	20	19	16	17	19	19	22	17	21	8	208	104	102	2	—	50	150	507	2 4	—	
20	103	Mrs. L. Hayes,	Feb 26	385	5 2	5 14	15	12	8	—	6	13	20	21	19	22	14	9	159	157	2	—	—	35	105	398	2 7	—	(a) 854 Eggs
		Walshestown,	,,	386	5 8	6 6	8	15	14	13	12	14	21	21	20	20	19	8	185	165	19	1	1	37	111	449	2 5	—	
		Castlemahon,	,,	387	5 6	5 11	—	1	13	11	12	10	21	23	20	19	14	8	152	137	15	—	1	14	39	356	2 5	—	(b) 27.7 oz.
		Newcastle West,	,,	388	5 2	6 2	16	21	17	18	21	21	17	16	11	11	18	8	195	57	127	11	—	50	150	451	2 2	2	
		Co. Limerick.	,,	389	5 8	D	—	4	15	15	17	16	18	11	6	4	—	D	106	81	25	—	—	19	57	235	2 5	—	(c) 2,017 Points
			,,	390	5 14	D	2	5	9	8	8	8	11	D6	—	—	—	—	57	53	4	—	1	16	48	128	2 8	—	

D = Dead.

SECTION IV.—RHODE ISLAND RED (STATION HOLDERS)—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1945	No. of Bird	Weight: On Arrival lb.	Weight: On Arrival oz	Weight: At Close of Test lb.	Weight: At Close of Test oz.	Production per Period: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First-Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Scoring Points: Full Period	Average Weight of Eggs oz.	dr.	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
21	50	Mrs. B. Keane,	Jan. 2	229	4	8	5	0	—	16	23	21	21	19	23	27	26	23	19	10	228	74	139	15	—	38	114	512	2	3	—	(a) 818 Eggs
		Kilfera House,	,,	230	5	12	6	13	—	—	13	13	1	5	22	25	28	9	19	10	145	140	5	—	—	13	39	341	2	7	1	
		Kilkee,	,,	231	4	8	6	3	5	—	—	20	12	7	2	4	—	—	—	—	50	40	10	—	1	5	15	103	2	5	—	(b) 27.0 oz.
		Co. Clare.	,,	232	5	0	7	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		—	
			,,	233	4	12	6	1	16	18	22	20	20	20	24	23	21	20	20	7	231	192	38	1	—	55	165	562	2	5	—	(c) 1,887 Points
			,,	234	4	8	5	10	—	—	—	16	16	20	20	25	22	15	21	9	164	10	152	2	—	—	—	369	2	2	1	
22	78	Mrs. D. Philpott,	February	337	5	4	6	4	18	11	—	—	15	17	20	23	18	20	20	10	172	5	122	45	—	—	—	299	2	0	—	(a) 961 Eggs
		Charlesfield,	,,	338	6	6	6	0	—	—	7	16	19	20	24	20	19	—	—	8	133	124	9	—	2	7	21	275	2	6	1	
		Banteer,	,,	339	6	4	7	2	15	17	20	22	20	8	17	18	14	21	11	6	189	58	106	25	10	34	102	373	2	3	—	(b) 26.2 oz.
		Co. Cork.	,,	340	5	10	6	4	16	23	20	19	17	14	19	21	12	9	8	10	188	10	146	32	—	33	99	372	2	1	2	
			,,	341	6	0	7	6	-	6	—	12	15	11	21	16	13	15	11	8	128	52	37	39	43	6	18	98	2	5	—	(c) 1,757 Points
			,,	342	6	8	5	8	—	18	23	18	19	19	20	20	14	—	—	—	151	120	30	1	—	40	120	340	2	5	—	
23	83	Miss C. Mealiff,	Feb. 23	367	5	0	6	3	18	17	19	18	19	20	20	22	17	16	11	4	201	2	161	38	1	29	87	383	2	1	—	(a) 802 Eggs
		Ballinamona House,	,,	368	4	12	5	14	20	20	21	19	16	16	21	18	9	10	6	—	176	82	88	6	1	55	165	409	2	3	—	
		Tullamore,	,,	369	5	2	6	2	22	1	—	10	20	23	23	17	17	13	16	1	163	72	85	6	—	18	54	360	2	3	1	(b) 26.9 oz.
		Offaly.	,,	370	5	14	7	7	4	10	17	14	10	13	17	14	15	5	3	—	122	121	1	—	1	31	93	281	2	11	—	
			,,	371	5	12	D		—	—	—	—	—	—	—	—	D	—	—	—	—	—	—	—	—	—	—	—	—		—	(c) 1,747 Points
			,,	372	5	5	5	4	16	20	16	14	12	17	13	12	5	5	8	2	140	98	39	3	11	49	147	314	2	4	—	

D = Dead.

SECTION V.—ANY NON-SITTING BREED—12 Pens.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1945	No. of Bird	Weight: On Arrival (lb. oz)	Weight: At Close of Test (lb. oz)	Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec 24–Jan. 20	Jan. 21–Feb. 17	Feb 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug 4	Aug. 5–Aug 18	Total	Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Scoring Points: Full Period	Average Weight of Eggs (oz. dr.)	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
1	88	*White Leghorn* Mrs. M. O'Shea,	Feb. 6	559	3 12	D	17	10	2	18	16	23	20	19	D10	—	—	—	135	124	11	—	—	29	87	299	2 6	—	(a) 1,020 Eggs
		Farrantane,	,,	560	4 12	5 10	14	13	17	9	18	19	17	18	19	17	17	8	186	173	12	1	—	43	129	455	2 6	—	
		Castlegregory,	,,	561	4 0	4 12	—	—	7	19	20	20	23	18	15	21	21	10	174	98	75	1	—	7	21	405	2 4	—	(b) 27.9 oz.
		Co. Kerry.	,,	562	3 12	4 7	16	17	19	15	18	20	19	21	12	20	19	4	200	163	32	5	—	47	141	480	2 5	—	
			Feb. 15	563	4 6	5 6	18	20	5	—	2	—	14	13	8	16	9	6	111	108	3	—	6	43	129	283	2 7	—	(c) 2,434 Points
			,,	564	4 0	5 3	1	14	19	19	19	20	23	24	22	22	21	10	214	198	15	1	—	33	99	512	2 5	—	
2	98	*White Leghorn* Mrs. P. Walton,	March 2	619	4 11	5 4	4	—	—	—	4	16	18	19	15	2	—	4	82	72	6	4	1	—	—	160	2 6	—	(a) 1,067 Eggs
		Ashtown Lodge,	,,	620	4 2	3 12	20	17	20	21	22	23	16	18	15	3	—	—	175	129	44	2	—	55	165	404	2 4	—	
		Castleknock,	,,	621	4 3	4 4	10	13	15	14	20	19	21	16	16	8	15	9	176	74	93	9	5	35	105	385	2 3	—	(b) 26 7 oz.
		Co. Dublin.	,,	622	4 12	5 8	18	7	5	18	19	21	23	21	23	22	17	11	205	185	20	—	—	30	90	490	2 5	—	
			,,	623	4 10	5 7	21	22	18	17	21	17	21	20	25	19	17	9	227	116	100	11	—	52	156	529	2 3	—	(c) 2,423 Points
			,,	624	4 0	4 4	16	17	18	19	16	15	19	22	18	16	18	8	202	34	153	15	—	44	132	455	2 2	—	
3	97	*White Leghorn* Mrs. L. Forster,	March 26	607	3 8	4 8	16	15	21	17	15	15	23	20	16	23	20	1	202	115	67	20	—	32	96	440	2 3	—	(a) 1,028 Eggs
		Tattybrack,	,,	608	3 12	4 8	15	15	19	16	19	16	18	16	20	19	18	9	200	66	108	26	—	24	72	418	2 2	—	
		Rockcorry,	,,	609	3 12	4 12	10	21	17	19	18	18	20	20	21	19	22	8	213	94	114	5	1	44	132	506	2 3	—	(b) 26.3 oz.
		Co. Monaghan.	,,	610	4 0	D	4	7	D	—	—	—	—	—	—	—	—	—	11	6	4	1	—	10	30	30	2 0	—	
			,,	611	4 0	4 8	8	16	18	22	20	19	22	20	20	18	17	6	206	165	39	2	—	40	120	489	2 5	—	(c) 2,266 Points
			,,	612	3 10	4 8	16	20	21	15	17	17	21	17	18	15	11	8	196	88	74	34	—	25	75	383	2 3	—	
4	86	*White Leghorn* Rev. Bro. Dominick,	March	547	3 4	4 2	3	12	—	12	19	19	19	19	15	17	18	7	160	109	49	2	—	13	39	371	2 4	—	(a) 1,005 Eggs
		Agricultural College,	,,	548	3 8	3 12	7	—	8	19	20	19	19	18	17	13	12	—	152	20	115	17	—	5	15	293	2 1	—	
		Mountbellew,	,,	549	3 6	4 7	9	8	7	18	17	19	21	20	17	17	17	7	177	17	134	26	6	5	15	328	2 1	—	(b) 26.3 oz.
		Co. Galway.	,,	550	4 5	4 14	15	17	16	15	19	18	21	19	20	15	17	6	198	144	52	2	—	46	138	476	2 4	—	
			,,	551	3 9	4 8	14	1	11	13	18	21	19	20	13	16	11	7	164	32	118	14	1	14	39	344	2 2	—	(c) 2,172 Points
			,,	552	4 12	5 7	10	16	15	11	17	16	20	16	12	8	8	5	154	139	10	5	—	36	108	355	2 6	—	
*5	87	*White Leghorn* Sister-in-Charge,	Jan. 13	553	3 12	4 8	19	20	19	20	21	12	16	3	11	9	8	3	161	1	64	96	10	12	36	127	1 15	—	(a) 1,039 Eggs
		St. Martha's College,	,,	554	4 4	5 9	16	15	17	18	14	22	20	15	11	12	19	4	183	150	33	—	—	48	144	449	2 5	—	
		An Uaimh,	Jan. 18	555	4 6	5 11	8	14	21	15	22	17	19	20	17	18	16	6	193	50	124	19	32	41	123	338	2 2	—	(b) 26.2 oz.
		Co. Meath.	,,	556	3 8	5 2	6	18	16	19	17	19	21	23	14	18	15	8	194	121	72	1	3	39	117	458	2 4	—	
			Jan. 13	557	3 14	D	6	12	20	17	16	19	21	17	20	D1	—	—	150	84	64	2	1	37	111	332	2 4	—	(c) 2,057 Points
			,, 18	558	3 8	4 8	14	—	2	12	17	16	19	23	18	14	14	9	158	60	95	3	3	15	45	353	2 3	—	

*Not eligible for Section Prize as the Pen produced less than 900 Scoring Eggs. D. = Dead

SECTION V.—ANY NON-SITTING BREED—continued.

Order of Merit	Number of Pen	Name and Address Owner	Date of Hatching in 1945	No. of Bird	Weight On Arrival lb. oz.	Weight At Close of Test lb. oz.	Oct. 1-Oct. 28	Oct. 29-Nov. 25	Nov. 26-Dec. 23	Dec. 24-Jan. 20	Jan. 21-Feb. 17	Feb. 18-Mar. 17	Mar. 18-Apl. 14	Apl. 15 May 12	May 13-June 9	June 10-July 7	July 8-Aug. 4	Aug. 5-Aug. 18	Total	Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First Grade	Special and First Grade—Oct. 1-Dec. 23	Scoring Points Oct. 1-Dec. 23	Scoring Points Full Period	Average Weight of Eggs oz. dr.	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
6	96	*White Leghorn* Mrs. M. E. Shanley,	March 30	601	3 8	5 1	11	16	21	16	19	19	22	19	22	17	11	7	200	41	137	22	1	36	108	421	2 2	—	(a) 866 Eggs
		Drumard,	,,	602	3 8	5 8	8	18	19	6	9	16	18	18	22	19	18	10	181	71	103	7	—	38	114	433	2 3	—	
		Drumod,	,,	603	3 14	6 0	—	6	18	20	18	22	22	19	15	20	19	7	186	45	136	5	—	23	69	431	2 3	—	(b) 26.0 oz.
		Co. Leitrim.	,,	604	3 2	6 0	—	—	11	17	20	21	20	18	21	18	15	11	172	25	134	13	—	4	12	365	2 2	—	
			,,	605	3 6	D	—	5	—	—	—	—	D	—	—	—	—	—	5	—	4	1	—	4	12	12	2 0	—	(c) 1,917 Points
			,,	606	3 4	4 14	—	—	4	14	17	18	11	16	19	13	10	—	122	88	34	—	6	4	12	255	2 5	—	
7	98	*White Leghorn* Mrs. K. Kelly,	March 2	583	3 0	4 10	—	—	—	15	21	22	22	22	18	15	19	7	161	102	58	1	—	—	—	360	2 4	—	(a) 825 Eggs
		Mount Mary,	,,	584	3 3	D	18	D	—	—	—	—	—	—	—	—	—	—	18	16	2	—	—	18	54	54	2 3	—	
		Ballygar,	,,	585	3 4	5 3	14	11	14	11	20	22	17	23	23	17	16	9	197	185	6	6	1	33	96	454	2 6	—	(b) 26.3 oz.
		Co. Roscommon.	,,	586	3 4	4 14	—	4	16	15	21	20	19	17	20	16	16	10	174	21	134	19	—	16	48	360	2 2	—	
			,,	587	3 0	5 4	6	18	16	—	—	8	19	3	10	8	19	2	109	47	61	1	—	40	120	285	2 3	—	(c) 1,818 Points
			,,	588	3 0	3 14	5	18	14	12	14	16	18	18	22	16	12	1	166	12	119	35	—	19	57	305	2 1	—	
8	94	*White Leghorn* Sister-in-Charge,	Feb. 21	589	4 6	4 10	10	17	18	7	—	17	13	22	22	13	15	7	161	39	113	9	1	37	111	373	2 2	—	(a) 790 Eggs
		Dom. Economy School,	,,	590	4 8	D	19	19	19	9	D	—	—	—	—	—	—	—	66	42	23	1	—	56	165	186	2 3	—	
		Swinford,	,,	591	4 10	5 0	—	—	9	17	21	19	21	20	16	14	20	6	163	32	122	9	—	6	18	352	2 2	—	(b) 26.5 oz.
		Co. Mayo.	,,	592	4 12	5 3	14	11	—	—	14	15	13	20	14	1	15	2	119	72	43	4	—	21	63	269	2 3	—	
			,,	593	4 8	4 8	—	—	6	16	19	17	21	20	10	13	16	2	140	116	24	—	—	6	18	317	2 5	—	(c) 1,813 Points
			,,	594	4 9	4 14	—	—	5	21	17	12	19	23	15	13	15	1	141	117	24	—	—	5	15	316	2 5	—	
9	90	*White Leghorn* Miss A. M. Dempster,	April 11	541	3 0	4 4	—	—	—	14	18	19	19	19	12	2	18	3	124	10	101	13	—	—	—	242	2 2	—	(a) 660 Eggs
		Emo Park,	March 16	542	3 8	D	—	—	15	7	D	—	—	—	—	—	—	—	22	16	6	—	—	15	45	59	2 4	—	
		Portarlington,	,, 27	543	3 3	4 6	—	—	—	19	22	21	18	19	11	20	17	5	152	146	6	—	—	—	—	346	2 6	—	(b) 27.0 oz.
		Laoighis.	,, 16	544	3 0	4 0	—	1	15	11	15	15	16	12	9	13	14	3	124	103	21	—	1	16	48	292	2 5	—	
			,, 16	545	3 8	4 8	—	10	17	15	15	18	18	16	16	18	20	6	169	100	68	1	—	26	78	406	2 4	—	
			April 11	546	3 0	D	—	—	—	16	13	19	17	4	—	—	—	D	69	17	51	1	—	—	—	136	2 3	—	(c) 1,481 Points
10	92	*White Leghorn* Mrs. M. Courtney,	March 12	577	4 4	5 9	—	—	—	15	17	15	15	18	12	13	13	6	124	41	80	3	—	—	—	273	2 3	—	(a) 755 Eggs
		Drumliff,	,,	578	4 0	4 12	14	—	3	13	20	25	19	10	5	—	—	—	109	—	9	100	—	3	9	21	1 14	—	
		Crosskeys P.O.,	,,	579	3 12	D	15	9	13	3	17	16	14	13	D	—	—	—	100	4	52	44	—	10	30	122	2 0	—	(b) 25.1 oz.
		Cavan.	,,	580	3 9	4 10	20	17	12	—	11	20	20	20	19	19	19	8	185	86	86	13	14	36	108	398	2 3	—	
			,,	581	3 2	3 11	18	15	—	11	16	18	19	20	13	23	15	1	169	31	125	13	—	25	75	374	2 2	—	(c) 1,333 Points
			,,	582	3 11	D	9	—	—	12	8	9	16	13	1	—	D	—	68	39	29	—	—	9	27	145	2 4	—	

D = Dead

SECTION V.—ANY NON-SITTING BREED—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1945	No. of Bird	Weight: On Arrival (lb. oz.)	Weight: At Close of Test (lb. oz.)	Production per Period: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 28	Full Period	Average Weight of Eggs (oz. dr.)	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
11	95	*White Leghorn* Mrs. N. McEllin,	March 12	595	4 2	D	—	—	—	—	D	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	(a) 650 Eggs
		Carrentubber,	,,	596	4 7	5 10	—	—	—	4	13	20	19	19	9	19	4	10	117	113	3	1	—	—	—	265	2 8	—	
		Manulla,	,,	597	4 2	5 4	14	18	19	14	19	14	14	12	10	4	1	—	139	11	84	44	1	15	45	208	2 0	—	(b) 26.6 oz.
		Castlebar,	,,	598	3 8	4 4	12	17	19	14	20	19	15	10	4	—	14	6	150	55	91	4	4	45	135	349	2 3	—	
		Co Mayo.	,,	599	3 14	5 1	11	7	—	5	11	17	20	18	20	4	18	8	139	130	9	—	6	18	54	312	2 6	—	(c) 1,325 Points
			,,	600	4 5	4 8	10	—	—	17	11	17	17	16	10	1	3	3	105	10	82	13	2	7	21	191	2 1	—	
12	91	*White Leghorn* Mrs. W. Byrne,	Feb. 21	571	3 14	D	—	12	15	13	15	—	D	—	—	—	—	—	55	28	27	—	—	27	81	137	2 3	—	(a) 443 Eggs
		Kilcar,	,,	572	3 12	D	22	23	16	9	D1	—	—	—	—	—	—	—	71	1	33	37	—	29	87	97	1 15	—	
		Curraghboy,	,,	573	4 0	4 3	—	1	19	15	13	19	22	24	22	16	10	—	161	117	44	—	—	20	60	368	2 4	—	(b) 26.2 oz.
		Athlone,	,,	574	4 4	D	—	—	D	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
		(Co. W'meath)	,,	575	4 6	5 14	15	10	—	8	11	18	22	19	19	4	10	1	135	86	44	5	—	19	57	293	2 4	—	(c) 958 Points
			,,	576	4 4	D	8	13	—	D	—	—	—	—	—	—	—	—	21	18	3	—	—	21	63	63	2 2	—	

D = Dead

SECTION VI.—ANY OTHER UTILITY BREED—13 Pens.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1945	No. of Bird	Weight: On Arrival (lb. oz.)	Weight: At Close of Test (lb. oz.)	Production per Period: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs (oz. dr.)	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
1	116	*Light Sussex* Mrs. J. Hely-Hutchinson,	January	457	6 3	7 5	22	20	19	15	12	22	23	27	27	24	22	10	243	45	132	16	—	57	171	566	2 2	—	(a) 1,220 Eggs
		Lissen Hall,	,,	458	5 13	7 14	14	—	1	21	23	23	23	25	23	14	18	6	191	48	138	5	—	12	36	420	2 3	—	
		Swords,	February	459	5 4	7 0	13	18	21	21	23	23	26	25	24	16	24	10	244	61	172	11	5	43	129	544	2 2	—	(b) 25.7 oz.
		Co. Dublin.	,,	460	5 2	6 5	—	—	15	18	20	18	16	19	16	12	16	4	154	88	66	—	6	15	45	342	2 4	—	
			January	461	5 7	6 9	—	2	23	20	19	22	24	21	17	5	14	8	175	16	146	13	—	22	66	370	2 2	—	(c) 2,740 Points
			,,	462	5 15	7 0	21	18	19	18	7	21	21	26	23	21	9	9	213	33	171	9	1	56	168	498	2 2	—	
*2	112	*Light Sussex* Sister-in-Charge,	Jan. 9	427	5 0	6 0	16	12	14	12	15	13	20	16	13	12	11	2	156	40	110	6	2	39	117	358	2 2	—	(a) 954 Eggs
		St. Martha's College,	,, 13	428	5 4	6 6	19	17	17	16	9	16	20	21	19	21	19	8	202	43	156	3	1	51	153	493	2 2	—	
		An Uaimh,	,, 9	429	5 6	6 9	18	12	4	19	18	20	19	14	10	5	13	4	156	116	38	2	—	34	102	364	2 4	2	(b) 27.4 oz.
		Co. Meath.	,, 13	430	5 0	6 14	—	—	11	20	16	12	11	10	20	11	16	5	132	127	5	—	12	11	27	275	2 8	—	
			,, 9	431	5 0	7 5	—	—	—	—	14	20	21	20	19	22	17	8	141	133	8	—	—	—	—	329	2 6	—	(c) 2,145 Points
			,, ,,	432	5 11	6 8	16	15	14	16	16	13	17	18	13	16	8	5	167	146	21	—	29	45	135	326	2 6	—	
*3	104	*Light Sussex* Sister-in-Charge,	Feb. 27	397	6 2	6 2	18	16	16	17	17	18	16	12	11	13	12	6	172	112	60	—	—	50	150	425	2 4	—	(a) 1,060 Eggs
		St. Mary's Abbey,	,,	398	5 8	6 6	—	21	19	16	16	18	18	11	16	11	12	8	166	1	52	113	—	2	6	128	1 15	3	
		Glencairn,	,,	399	5 8	5 11	18	18	17	16	17	20	19	19	15	20	15	8	202	9	129	64	—	11	33	329	2 0	—	(b) 26.1 oz.
		Co. Waterford.	,,	400	5 14	6 13	12	16	21	16	17	16	18	19	18	18	10	—	181	171	8	2	1	47	141	431	2 6	—	
			,,	401	5 14	6 8	20	12	—	—	19	19	23	19	11	15	5	2	145	87	53	5	5	31	93	323	2 4	—	(c) 2,087 Points
			March 21	402	5 11	7 4	20	18	18	17	20	17	9	19	20	13	15	8	194	146	46	2	10	54	162	451	2 4	—	
*4	117	*Buff Rock* Mrs. M. A. Walshe,	Jan. 12	493	5 12	7 2	16	17	13	13	19	19	13	11	9	—	—	—	130	122	7	1	—	45	135	303	2 6	—	(a) 924 Eggs
		Tullamore,	,, 25	494	5 1	5 12	—	10	19	18	21	22	22	20	18	21	6	9	186	15	152	19	—	24	72	390	2 1	—	
		Listowel,	,, ,,	495	5 0	6 8	—	—	—	—	11	18	18	—	15	10	3	4	79	76	3	—	—	—	—	175	2 8	1	(b) 26.9 oz.
		Co. Kerry.	,, ,,	496	5 0	5 8	—	—	19	18	20	18	22	24	14	16	18	7	176	151	25	—	—	19	57	412	2 6	—	
			Feb. 1	497	5 1	6 6	—	15	20	16	19	19	20	19	15	22	17	7	189	23	144	22	—	18	54	398	2 2	—	(c) 2,061 Points
			,,	498	5 0	5 8	—	17	15	11	16	19	21	21	12	11	18	3	164	109	51	4	—	32	96	383	2 4	2	
*5	113	*Light Sussex* Miss M. Daly,	Jan. 9	439	5 12	7 1	23	23	20	21	22	19	24	21	28	22	20	8	251	62	183	6	—	60	180	600	2 2	—	(a) 1,098 Eggs
		Knockglass,	,,	440	5 3	6 3	15	18	19	22	21	20	22	16	16	11	16	4	200	194	6	—	45	52	156	371	2 6	—	
		Moynalty,	,,	441	5 1	6 12	13	12	—	9	11	20	25	14	12	16	14	2	148	11	101	36	3	16	48	260	2 1	2	(b) 25.8 oz.
		Ceanannus Mór,	,,	442	5 0	6 7	—	—	12	19	20	20	23	16	15	10	5	7	147	115	31	1	12	12	36	294	2 4	1	
		Co. Meath.	,,	443	5 0	6 7	22	22	21	22	16	10	14	16	20	19	14	9	205	2	89	114	29	10	30	150	1 15	—	(c) 1,974 Points
			,,	444	5 0	6 4	16	—	—	9	24	22	12	16	19	14	11	4	147	17	117	13	3	12	36	299	2 2	2	

*Not eligible for Section Prize as the Pen produced less than 900 Scoring Eggs.

SECTION VI.—ANY OTHER UTILITY BREED—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1945	No. of Bird	Weight: On Arrival lb oz	Weight: At Close of Test lb. oz.	Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Scoring Points: Full Period	Average Weight of Eggs oz. dr.	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
6	114	*Light Sussex*	Feb. 20	445	5 0	6 5	—	—	—	5	19	22	15	22	19	10	10	10	132	11	102	19	—	—	—	255	2 1	1	(a) 904 Eggs
		Mrs. A. Quilty,	,,	446	5 0	5 8	—	—	10	18	22	17	14	16	—	4	—	—	101	95	5	1	—	10	30	214	2 8	—	
		Nicholastown,	,,	447	5 9	7 3	19	21	19	14	13	19	21	23	23	19	19	8	218	8	152	58	—	21	63	385	2 1	—	(b) 26.4 oz.
		Mooncoin,	,,	448	5 6	6 12	—	—	—	10	17	17	20	18	19	19	16	5	141	70	71	—	3	—	—	314	2 4	—	
		Co. Kilkenny.	,,	449	5 0	6 14	9	2	12	18	15	18	23	14	—	16	9	10	146	114	28	4	—	21	63	338	2 5	1	(c) 1,900 Points
			,,	450	5 10	8 0	—	2	21	19	19	19	20	14	13	18	11	10	166	101	65	—	—	23	69	394	2 4	1	
7	106	*Light Sussex*	March 4	403	6 4	9 4	20	12	15	14	13	16	10	3	—	—	—	—	103	24	60	19	—	30	90	198	2 1	—	(a) 917 Eggs
		Sister-in-Charge,	,,	404	6 0	7 3	12	15	10	14	15	15	19	18	13	8	5	4	148	5	61	82	1	4	12	148	1 15	—	
		St. Mary's Abbey,	Feb. 27	405	5 5	7 13	18	15	16	18	16	17	17	16	11	12	4	—	160	71	73	16	1	33	96	334	2 3	—	(b) 26.5 oz.
		Glencairn,	March 14	406	5 7	8 7	7	14	13	4	14	17	21	15	15	15	18	8	161	38	110	13	—	26	78	363	2 2	—	
		Co. Waterford.	,, 21	407	5 7	7 2	18	10	16	19	17	22	19	19	18	—	—	—	167	150	15	2	10	51	153	361	2 6	—	(c) 1,821 Points
			Apıil 7	408	5 4	8 12	—	—	21	18	20	19	21	19	20	20	13	7	178	171	7	—	—	21	63	417	2 8	—	
8	110	*Light Sussex*	March 5	415	5 0	6 6	12	14	15	18	16	22	20	13	3	10	2	—	145	34	88	23	21	34	99	240	2 2	—	(a) 953 Eggs
		Miss U. Roche,	Feb. 3	416	5 0	6 0	10	—	—	5	5	21	22	14	18	8	7	7	117	43	64	10	1	5	15	239	2 3	1	
		Creevaghbeg,	March 5	417	5 0	5 12	7	12	17	19	21	19	12	19	14	4	15	4	163	91	68	4	2	36	108	372	2 4	—	(b) 25 8 oz.
		Ballymahon,	,, 23	418	5 0	6 3	—	—	6	9	12	18	19	22	23	23	20	7	159	96	59	4	17	6	18	329	2 4	—	
		Mullingar,	,, ,,	419	5 0	5 8	10	16	18	18	—	20	24	25	20	8	15	8	182	13	83	86	—	21	63	227	2 0	1	(c) 1,820 Points
		Co Westmeath.	Feb. 3	420	5 4	6 12	—	—	—	22	21	23	22	23	23	22	20	11	187	104	79	4	2	—	—	413	2 4	—	
9	115	*Light Sussex*	March 3	451	5 10	6 6	20	18	18	21	15	19	20	16	18	14	14	4	197	75	100	22	1	37	108	414	2 3	—	(a) 953 Eggs
		Mrs. M. Comerford,	,,	452	5 0	6 14	—	15	18	5	13	17	19	15	12	12	9	12	147	8	100	39	—	19	57	255	2 0	3	
		Lamogue,	,,	453	5 2	5 12	17	20	18	19	16	17	19	21	11	11	14	7	190	6	135	49	33	27	81	273	2 0	2	(b) 25.3 oz.
		Windgap,	,,	454	5 2	6 4	6	—	3	14	18	15	21	20	13	21	11	10	152	24	119	9	—	7	21	335	2 2	—	
		Co. Kilkenny.	,,	455	5 13	6 7	18	5	—	17	21	14	20	11	3	5	10	4	128	113	14	1	10	22	66	269	2 6	—	(c) 1,738 Points
			,,	456	6 2	7 6	17	7	—	—	13	20	20	11	16	14	12	9	139	1	82	56	1	1	3	192	2 0	1	
10	105	*Light Sussex*	Feb 23	463	6 8	8 5	—	5	16	17	16	16	20	10	10	4	10	5	129	123	6	—	—	21	63	298	2 8	2	(a) 763 Eggs
		Miss M. Brett,	,,	464	5 8	5 14	8	8	2	10	15	7	14	11	9	—	10	—	94	13	60	21	—	12	36	165	2 1	1	
		Kylenahone,	,,	465	6 0	7 10	18	15	22	14	12	20	25	7	2	19	11	9	174	102	71	1	1	54	162	436	2 4	1	(b) 26.9 oz.
		Killenaule,	,,	466	5 12	6 15	14	—	12	11	10	14	18	11	11	12	9	1	123	9	83	31	—	12	36	214	2 1	1	
		Thurles,	,,	467	5 10	6 12	13	—	11	21	10	21	12	5	—	15	13	3	124	98	26	—	—	24	72	303	2 5	2	(c) 1,704 Points
		Co. Tipperary.	,,	468	5 9	7 11	—	15	21	15	10	10	13	9	10	13	1	2	119	90	28	1	—	36	108	288	2 5	—	

SECTION VI.—ANY OTHER UTILITY BREED—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1945	No. of Bird	Weight: On Arrival lb. oz.	Weight: At Close of Test lb. oz.	Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Scoring Points: Full Period	Average Weight of Eggs oz. dr.	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
11	118	*Buff Rock* Mrs. C. L. Cardew,	March 7	469	5 6	5 9	15	10	—	20	17	15	12	12	14	14	13	4	146	132	12	2	—	24	72	343	2 6	1	(a) 746 Eggs
		Castlefogarty,	,,	470	5 0	6 2	11	14	12	17	17	15	20	14	11	3	7	6	147	122	23	2	—	35	105	341	2 5	—	
		Thurles,	,,	471	5 11	5 2	—	5	15	18	16	15	28	16	20	8	—	-	136	48	85	3	5	20	60	284	2 3	—	(b) 27. 5 oz.
		Co. Tipperary.	,,	472	5 6	D	13	1	—	D	—	—	—	—	—	—	—	—	14	—	1	13	—	1	3	3	1 13	—	
			,,	473	5 4	7 11	5	14	23	14	20	21	15	13	12	7	9	4	157	112	41	4	—	38	114	364	2 5	—	(c) 1,680 Points
			,,	474	5 6	6 0	5	9	14	13	17	18	14	10	15	11	16	4	146	114	31	1	1	27	81	345	2 5	—	
12	111	*Light Sussex* Mrs. E. Wilsdon,	Feb. 1	421	6 6	7 9	14	10	6	5	9	9	18	18	20	16	10	9	144	42	96	6	1	26	78	335	2 2	—	(a) 856 Eggs
		Lacken Lodge,	,,	422	5 6	6 14	17	20	14	8	11	8	11	17	11	2	12	6	137	13	45	79	30	7	21	63	2 0	—	
		Kilkenny.	,,	423	5 5	5 14	6	2	—	—	4	20	22	24	19	10	16	9	132	22	101	9	2	6	18	281	2 2	1	(b) 25.6 oz.
			,,	424	5 13	7 8	7	19	2	—	2	20	21	22	23	20	11	7	154	105	47	2	—	26	78	368	2 4	—	
			,,	425	6 0	7 2	—	—	7	14	7	12	17	22	10	14	15	3	121	47	73	1	33	7	21	190	2 3	—	(c) 1,577 Points
			,,	426	5 0	7 0	16	17	19	13	19	16	24	17	14	11	2	—	168	43	110	15	10	48	144	340	2 2	—	
13	108	*Light Sussex* Miss B. Roche,	Feb. 28	409	5 15	D	5	—	—	—	—	D	—	—	—	—	—	—	5	—	2	3	—	2	6	6	1 13	—	(a) 408 Eggs
		Clearestown,	,,	410	5 10	D	19	15	14	11	6	—	D	—	—	—	—	—	65	—	45	20	—	30	90	120	2 0	—	
		Co. Wexford.	,,	411	6 0	D	19	1	—	—	16	18	21	5	D	—	—	—	80	—	37	43	—	6	18	80	1 15	1	(b) 26.1 oz.
			,,	412	5 12	7 0	10	1	20	5	24	14	17	16	17	15	7	12	158	55	89	14	—	24	72	346	2 8	2	
			,,	413	5 15	D	7	—	—	D	—	—	—	—	—	—	—	—	7	—	1	6	—	1	3	3	1 12	—	(c) 1,011 Points
			,,	414	5 10	7 4	19	16	13	—	18	19	22	15	21	22	16	7	183	176	7	—	1	48	144	456	2 6	—	

D = Dead.

DEPARTMENT OF AGRICULTURE

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CONTENTS

APHOSPHOROSIS IN CATTLE IN COUNTY OFFALY

By

E. J. Sheehy, J. O'Donovan, W. R. Day, and S. Curran.

In order that health, thriftiness and good production may obtain, farm animals must receive a diet containing, in adequate quantity, a variety of inorganic substances commonly referred to in animal nutrition as minerals. Among these is phosphorus, a substance which enters largely into milk and into the new tissue formed during growth, and which is essential for the normal functional every-day activity of the body organs. The body carries an appreciable reserve of phosphorus in the form of calcium phosphate in the skeleton, and this reserve is drawn on when the daily intake is inadequate. An adult is thereby capable of living for a period on a phosphorus deficient diet but, as the body reserves are depleted, production declines, health degenerates, and symptoms of illhealth, which in the early stages may be indefinite, become more and more pronounced. The young beast is prevented by the deficiency from making normal growth even on a diet which is otherwise adequate, and a stunted condition becomes manifest. When the intake of phosphorus in the daily diet falls seriously short of the animal's requirements symptoms of aphosphorosis in the animal become unmistakeable in a comparatively short time, but when the degree of phosphorus deficiency in the diet is only slight there may, for quite a long time, be no more pronounced indication of malnutrition than general unthriftiness, lack of "bloom," and failure to reach a high or even a mediocre standard of production. It would appear that the latter condition obtains in very many parts of this country, and that the more obvious phosphorus deficiency symptoms, which are of less frequent occurrence, are, by farmers, frequently attributed to causes other than the real one.

While earlier observers make general reference to the relationship between the appearance, health and behaviour of animals and a possible deficiency of "all the earthy matters required," to Theiler, Green and Du Toit (1) goes the credit of first demonstrating (by feeding experiments, analysis of herbage and soil, and examination of blood phosphorus) the fact that a deficiency of phosphorus in the pasture herbage of cattle living solely or largely on that pasture, is responsible for such a degree of body disorder as to render cattle-rearing in affected areas uneconomic. The publication of their results set agoing similar investigations elsewhere, and the great volume of li-

reviewed by Theiler and Green (2), which is now available, testifies to phosphorus deficiency in pastures in Africa, North America, Australia and in many other parts of the world.

INCIDENCE OF APHOSPHOROSIS IN IRELAND.

The suggestion by one of the authors (J. O'D.) of the possible occurrence of aphosphorosis in the County of Offaly in this country started an investigation the results of which form the subject of this paper. Advance notes (3) (4) recording the existence of the condition and giving some preliminary results have been published. The condition of aphosphorosis is rather widespread in Offaly where the disorder is commonly known as "bog crook," "bog lame," "rheumatism," or "leg fever." Its location and severity have been noted and are mapped out in Figure 1.

The financial losses caused by it are very serious. Many young cows depreciate so much as to become practically useless either for milk or meat, and those which do not die on the farm are disposed of at very low prices.

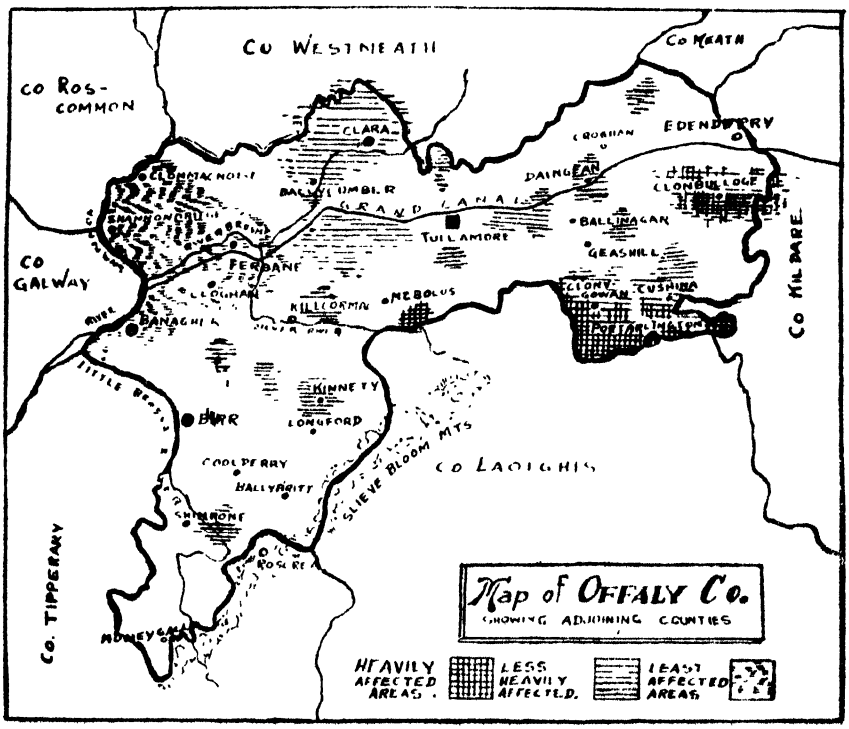

Figure 1.—Showing the widespread incidence of aphosphorosis in Offaly County.

The disorder is seasonal, occurring during the summer and autumn months when the diet of cattle is restricted solely to pasture. Most farmers realise that supplementary feeding on pasture helps to hold the disorder in check, or at least to prevent the onset of severe symptoms. Bran is freely fed and while it undoubtedly has a retarding effect it is not able to prevent the disorder. The majority of animals showing symptoms during the grass-fed period recover or show partial recovery when fed on concentrates during the winter. Many of those animals become affected again during the subsequent grazing period. The incidence of aphosphorosis, or at any rate of that pronounced form of it which causes definite pathological conditions in cattle, is accordingly worst during the grazing period, but symptoms are less pronounced when the herbage is supplemented by meals, especially by bran, a food which is rich in phosphorus. Stock-owners have attributed the disorder to the wet nature of low-lying pastures which occur freely in many parts of the county, but dry upland produces symptoms equally severe. Cows, as already stated, are the common subjects, Shorthorns appearing to be more susceptible than cross-breds. High-yielding animals are more subject than low-yielding ones. Symptoms are more pronounced during periods of prolonged drought and they are lessened in intensity after a period of rain. The disease has been known to exist for generations in parts of the county. A change to good grazing prevents the symptoms from developing, and causes them to disappear if they have already developed.

SYMPTOMS.

The symptoms of the disorder are as follows :—severe lameness of one or more legs, arched back, a groan when moving, and a stiffness and crackling in the joints. Animals showing above symptoms, as well as others grazed with them, show depraved appetite and chew at timber, bones, leather, and rags. This, however, is more pronounced during the early stages of the disorder. There is a loss of appetite, a reduction in the amount of water consumed, and animals become thin, emaciated, and hidebound. They separate themselves from the remaining members of the herd and remain lying for long periods. Animals severely affected travel with difficulty, and often graze on their knees. If the disorder persists temporary deformities set in.

The deformities manifest themselves in swelling of the joints due to exudation of fluid, abnormal growth of hooves, stiffness of the backbone and neck, with characteristic arching of the back and inability to raise the head to the normal position of a healthy animal. The body and girth are drawn up and animals present the appearance of piners. Staring coats and drab colours are also characteristic of the complaint. Milk yields are very seriously reduced, constipation sets in, the dung is reduced in quantity and lacks the consistency of that of animals fed on summer grass. Temporary sterility in cows is general.

It is common for animals to go two or three years without producing a calf or even coming in season. These latter symptoms are characteristic of chronically affected cases.

Less pronounced symptoms of disorder are fairly widespread, causing reduction in milk yields and in condition, and producing unthriftiness and subnormal growth in young stock. Evidence of this condition of young stock is forthcoming both from the farm and cattle fairs. Two-year-olds are no bigger than yearlings, bone is light, and the animals are thin, presenting the appearance of being underfed although well cared for. The specific symptoms associated with dairy cows are less commonly met with in young stock, but nevertheless, young animals showing some of the specific dairy cow symptoms were met with in the course of investigations.

In Figure 2 are shown two cows in which the symptoms of the disorder have become apparent though not yet pronounced.

FEEDING TESTS (Cows).

On the assumption that the disorder was caused by a deficiency of one or more minerals in the herbage grazed by the stock, a number of tests were conducted on different farms where certain affected animals received a mineral supplement and their progress compared with comrades from which the mineral supplement was withheld. The relevant details of the tests and the results obtained are set out hereunder.

Test I:

Three Cows which were definitely affected were each given, in addition to the grazing or other farm diet, 4 ounces daily of a mineral mixture made up as follows:—

	grams
Sterilised bone flour	84
Salt (sodium chloride)	28
Iron Oxide	1
Copper sulphate	0.2
Cobalt chloride	0.016
Total ..	118.216 grams (app. 4 ozs.)

This was fed in conjunction with ½lb. of sugar pulp, a food which contains

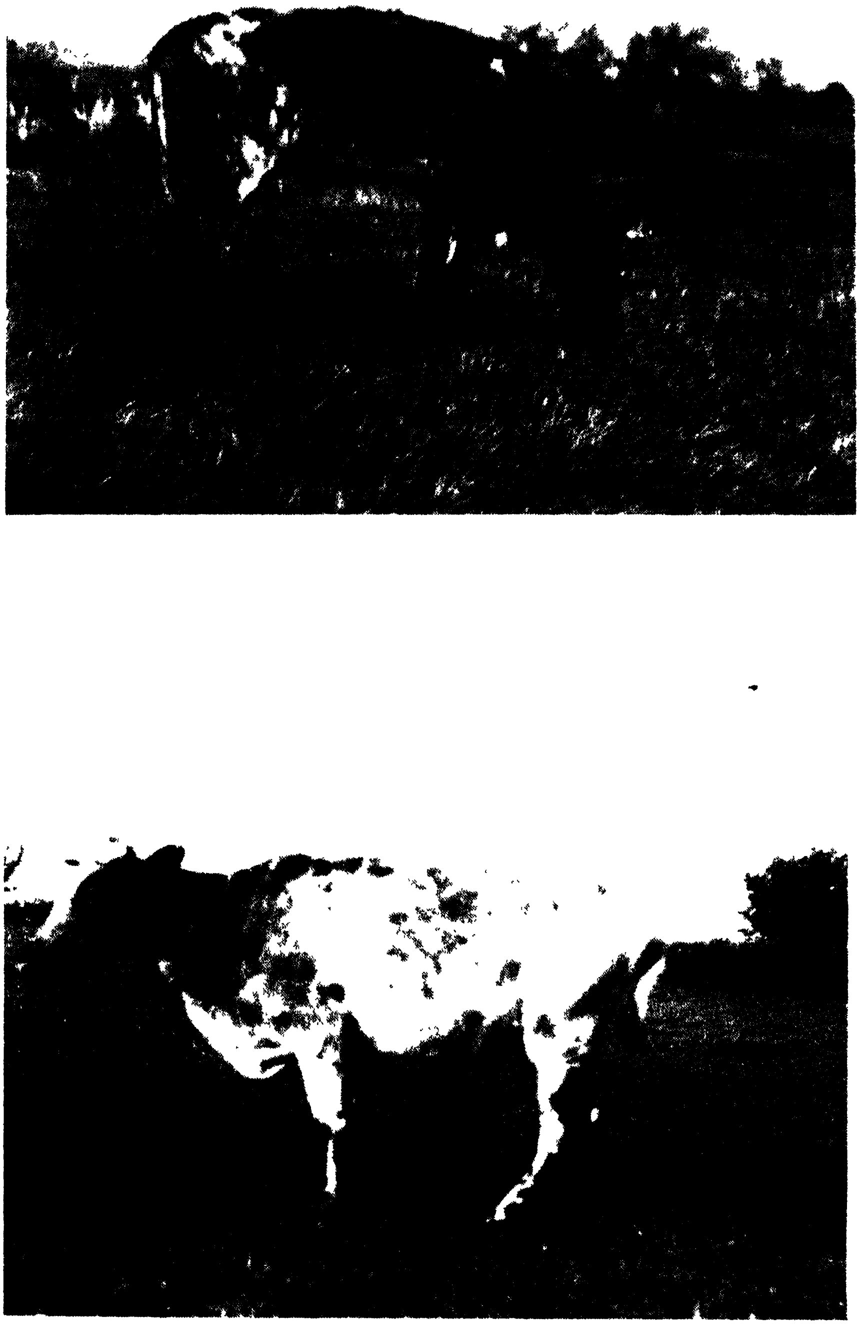

Figure 2. Cows suffering from aphosphorosis.

exceedingly little phosphate. A fourth or control cow which was equally badly affected, was given the daily allowance of ½ lb. of sugar pulp without any minerals.

RESULT:

After three weeks feeding of minerals there was a noticeable improvement in condition, body weight, appearance, colour and milk yield of the three cows which received the mineral supplement. Complete recovery was effected in seven to twelve weeks after treatment started. The control animal got progressively worse. When the test was completed she was fed the mineral mixture and recovered completely.

TEST II:

SIX Cows showing definite evidence of the disorder were selected and THREE were fed on a mixture of meat and bone meal, salt, iron, copper sulphate and cobalt. Each cow got 11 ozs. per day of the mixture in conjunction with ½ lb. of moist sugar pulp.

THREE CONTROL cows were fed ½ lb. moist sugar pulp each per day.

RESULT:

Improvement was noted in the case of the cows receiving the meat and bone meal and minerals in three weeks. Symptoms of stiffness and lameness disappeared completely in seven to twelve weeks. Animals recovered their level appearance and there was a marked improvement in condition, body weight and milk yields. Fertility was restored in seven to twelve weeks.

The CONTROLS showed no improvement. They were still stiff and lame with arched backs and hidebound condition at the end of the experiment. There was no improvement in condition, body weight, appearance, milk yield or fertility. These animals were treated at the end of the experiment and recovered.

TEST III:

FOUR Cows showing definite evidence of the disorder were selected and THREE were fed on a mixture of *steamed bone flour* (containing both calcium and phosphorus) and *salt* at the rate of 4 ozs. per head per day in conjunction with ½ lb. moist sugar pulp.

The FOURTH or CONTROL ANIMAL was fed on ½ lb. moist sugar pulp daily.

RESULT:

First signs of improvement were noted in the case of the cows fed on steamed bone flour and salt in three weeks. Complete recovery was effected in seven to nine weeks. Stiffness and tenderness had completely gone. Animals

became level and there was an improvement in milk yield and condition. Fertility was restored in one month after treatment started.

CONTROL did not recover. She was still stiff and lame with arched back and hidebound condition at the end of the test. There was no improvement in milk-yield, bloom, appearance, or fertility. This animal was treated at the end of the test and recovered.

TEST IV:

FOUR Cows showing definite evidence of the disorder were selected for this trial, and THREE were fed on *meat and bone meal and salt* at the rate of 11 ozs. per head per day in conjunction with ½ lb. moist sugar pulp. The CONTROL ANIMAL was fed ½ lb. sugar pulp daily.

RESULT:

First improvement was again noted in three weeks and complete recovery took place in seven to eight weeks. Stiffness and lameness had completely disappeared, and the animals presented a level appearance, skin was loose, and body development good. Improvement in milk yields was noted in all cases.

THE CONTROL showed no improvement. She was still stiff and lame at the end of the experiment. There was no improvement in milk yield, condition or fertility. This animal was treated at the end of the experiment and recovered.

TEST V:

SIX Cows showing definite evidence of the disorder were selected and THREE were fed on *steamed bone-flour* at the rate of 3 ozs. per head per day in conjunction with ½ lb. moist sugar pulp. THREE CONTROL ANIMALS were fed ½ lb. moist sugar pulp per head daily.

RESULT:

Improvement was noted in the case of all animals on steamed bone flour in three weeks. Complete recovery was effected in six to ten weeks. Stiffness, tenderness and lameness had completely disappeared. There was a marked improvement in condition, body weight, appearance, bloom and milk yield. These cows had calved eight to ten months before the experiment started and should normally be in calf but had not come in season. Fertility was restored in three to six weeks after treatment started, by which time the oestrus or heat period had recurred in all cases.

THE CONTROLS showed no improvement during the test. They were still stiff and lame at the end of the experiment, with arched backs and hide-

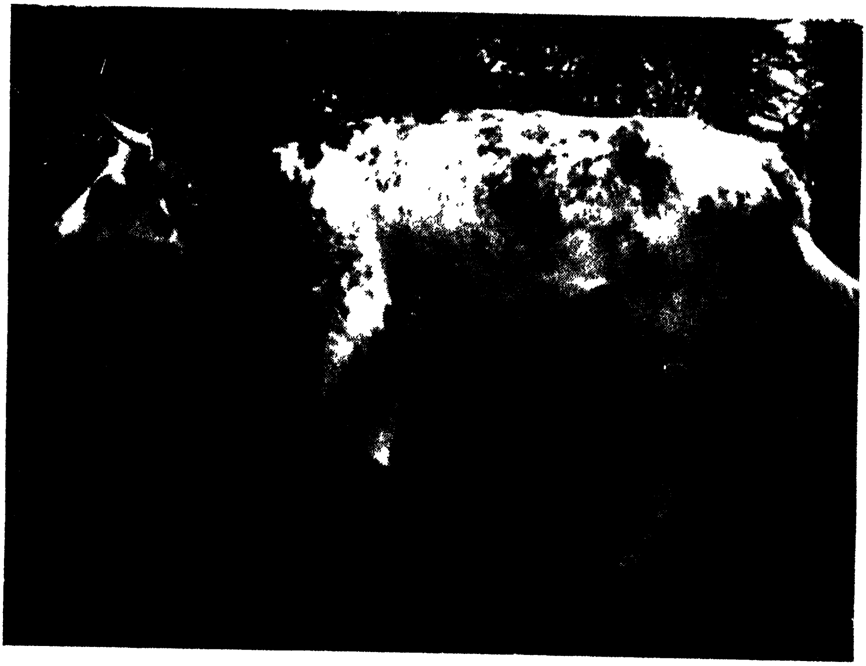

Figure 8. (*a*) Cow suffering from aphosphorosis.

Figure 8. (*b*) Same cow after feeding of phosphate.

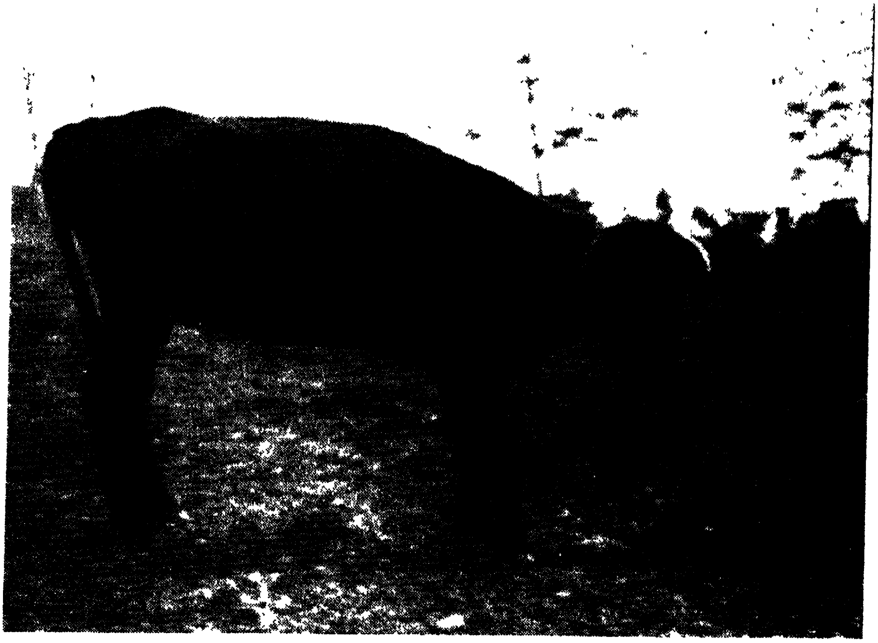

Figure 4. (*a*) Cow suffering from aphosphorosis.

Figure 4. (*b*) Same cow after feeding of phosphate.

bound condition. There was no improvement in bloom, condition, milk yield or fertility. The controls were treated at the end of the experiment and recovered.

TEST VI:

FIVE Cows showing definite evidence of the disorder were selected, and THREE were fed on meat and bone meal at the rate of 10 ozs. per head per day in conjunction with ½ lb. of moist sugar pulp.

Two CONTROLS were fed ½ lb. moist sugar pulp per head daily.

RESULT:

Improvement was again noted in the case of all animals on meat and bone meal in three weeks. Complete recovery was effected in seven to twelve weeks. Stiffness and lameness had disappeared completely. There was a marked improvement in condition, body development, appearance, and milk yields. Fertility was restored in four to seven weeks.

THE CONTROLS showed no improvement. They were still stiff and lame at the end of the experiment, and there was no improvement in condition, milk yields or fertility. They were treated at the end of the experiment and recovered.

TEST VII:

Individual cows in a rather advanced stage of the "disease," and showing the typical symptoms already described, were given a daily supplement of 1 oz. of sodium phosphate.

RESULT:

Inside three weeks definite signs of recovery appeared and in six to eight weeks the cows had regained normal appearance; the skin which was previously adhering tightly to the body became loose and mellow to the feel, the level bearing of the body and suppleness in gait were restored, and the dull drab colour had appreciably brightened up.

TEST VIII:

Ground limestone was fed to cows showing definite evidence of the disorder.

RESULT:

The results were negative, the animals showing no improvement whatsoever as a result of supplementing the diet with calcium (lime) which was the only mineral supplied by the pure limestone.

Figures 3 (*a*) and 4 (*a*) show the appearance of cows suffering from

aphosphorosis before treatment, and Figures 3 (*b*) and 4 (*b*) show the same animals after they had received supplementary phosphates for seven weeks.

The foregoing series of tests showed that the affected cows were suffering from a deficiency of minerals in their diet, and that the particular element, a shortage of which was responsible for the disorder, was phosphorus. In physiological terminology the cattle suffered from aphosphorosis. When a phosphorus-containing compound, such as pure sodium phosphate or sterilised bone flour or meat-and-bone meal, was given as a supplement to the diet, rapid relief from the disordered condition was provided. Calcium in the form of ground limestone had no beneficial effect, while phosphorus proved as efficacious as a mixture of a number of mineral substances.

Subsequent to the feeding tests, phosphorus-containing supplements have been widely used, with consistently satisfactory results, to treat aphosphorosis in Offaly. A couple of ounces of steamed bone flour (containing some 60 per cent. of calcium phosphate) per day, or 4 to 8 ounces of meat-and-bone meal (containing 30 to 35 per cent. of calcium phosphate) per day, have proved ample for the purpose. Fish meal—4 to 8 ounces per animal daily—would prove equally effective, as would feeding calcium phosphate, a material which has become available in limited quantity.

Though salt (sodium chloride) is not essential to relieve aphosphorosis, it is advisable, in view of results obtained from subsequent determinations, to feed salt—½ to 1 ounce—in conjunction with the daily allowance of phosphate, and while the results to date do not show the necessity to feed other mineral supplements, there are indications that for maximum growth of young stock and for full production from milch cows, it may be necessary, in certain parts of the country at any rate, to supplement the diet with other minerals also.

COMPOSITION OF GRAZING HERBAGE, DRY FODDER, AND OF SOIL.

The next step in the investigation was to determine the composition of the herbage collected from fields grazed by cattle which suffered from aphosphorosis, and to make comparison with herbage from neighbouring fields on which aphosphorosis did not occur and with the herbage from good grazing land. In conjunction with this the advisability of analysing the soil was indicated. The composition of the hay fed on affected farms would also give useful information. Accordingly the mixed herbage from a large number of fields was sampled in August and again in early November, and Table I gives the phosphate and lime of the herbage and the phosphate status of the soil.

TABLE I.

Pasture number, and the occurrence or non-occurrence of aphosphorosis in cows grazing thereon	Type of Pasture	Pasture Herbage: Phosphate (P_2O_5) in dry matter per cent.	Pasture Herbage: Lime (Ca O) in dry matter per cent.	Time of Collection of Sample	Phosphate (P_2O_5) Status of Soil: lb. of available phosphate per acre	Phosphate (P_2O_5) Status of Soil: Regarded as
1. Occurrence	Moor	0.25 0.31	0.89 0.91	August November	Less than 2	Negative
2. Occurrence	Moor	0.28 0.39	0.80 0.90	August November	Less than 2	Negative
3. Occurrence	Moor	0.27 0.39	1.10 0.85	August November		
4. Occurrence	Moor	0.28	1.10	August		
5. Occurrence	Moor	0.21 0.21	1.10 0.88	August November	Less than 2	Negative
6. Non-occurrence	Upland	0.40 0.52	0.89 1.00	August November	4	Extra low
7. Occurrence	Semi-moor	0.31 0.32	0.99 1.00	August November		
8. Occurrence	Semi-moor	0.27 0.26	0.90 1.10	August November	Less than 2	Negative
9. Occurrence	Semi-moor	0.23 0.23	1.20 1.00	August November	4	Extra low
10. Occurrence	Semi-moor	0.23 0.27	1.40 1.20	August November		
11. Occurrence	Moor	0.28 0.24	1.00 1.10	August November	5⅓	Extra low
12. Non-occurrence	Upland	0.37 0.54	1.10 0.82	August November	4	Extra low
13. Occurrence	Moor	0.21 0.18	1.00 0.84	August November	Less than 2	Negative
14. Non-occurrence	Upland	0.34 0.41	1.00 0.89	August November	4	Extra low
15. Non-occurrence	Upland	0.30 0.38	1.00 0.68	August November	2⅔	Extra low
16. Occurrence	Moor	0.28 0.27	0.96 0.84	August November	2⅔	Extra low
17. Occurrence	Moor	0.23 0.25	1.10 0.95	August November		
18. Non-occurrence	Upland	0.37 0.41	0.91 0.70	August November	Less than 2	Negative
19. Occurrence	Moor	0.30 0.36	0.94 0.89	August November	2⅔	Extra low
20. Occurrence	Moor	0.21 0.22	1.00 0.93	August November	2⅔	Extra low
21. Non-occurrence	Upland	0.31 0.47	0.93 0.73	August November	2⅔	Extra low
22. Occurrence	Semi-moor	0.35 0.38	1.20 1.04	August November	2⅔	Extra low
23. Occurrence	Upland	0.29 0.42	1.20 1.04	August November	8	Extra low
24. Occurrence	Moor	0.32 0.42	0.83 0.71	August November	4	Extra low
25. Occurrence	Moor	0.30 0.37	0.95 0.89	August November	Less than 2	Negative
26. Non-occurrence	Moor	0.35 0.40	1.00 0.88	August November	8	Extra low
27. Non-occurrence	Upland	0.46 0.66	1.00 0.80	August November	5⅓	Extra low
28. Occurrence	Moor	0.30 0.36	0.98 0.71	August November	2⅔	Extra low
29. Non-occurrence	Upland	0.44 0.56	0.80 0.60	August November	5⅓	Extra low
30. Occurrence	Moor	0.20 0.23	1.10 0.91	August November	2⅔	Extra low
31. Occecurrence	Upland	0.28 0.38	0.83 0.72	August November	2⅔	Extra low
32. Occurrence	Semi-moor	0.42 0.32	1.05 0.96	August November	4	Extra low
33. Non-occurrence	Upland	0.39 0.69	1.60 1.30	August November	4	Extra low
34. Occurrence	Moor	0.23 0.30	1.10 1.00	August November	2⅔	Extra low

The data in Table I indicate that, in comparison with normal good pasture which has a phosphate (P_2O_5) content—percentage in dry matter—of 0.9 to 1.1, the phosphate in all the herbage examined is low. While it is true that the level of phosphate in the herbage of those areas on which "bog crook" did not occur is generally higher than that in the herbage from areas where the disorder developed, nevertheless both the moors and adjoining uplands support a flora which shows a deficiency of phosphate. Little significance is to be attached to the non-occurrence of "bog crook" on some of the fields, as the composition of the herbage of even these would indicate a phosphate deficiency, and the fact that the disorder did not occur there is explainable by the animals having access at times to other pastures or to other supplementary feeding. The fact that the phosphate is abnormally low in some upland grazing as well as on the moors and semi-moors is significant.

Generally speaking the lime content (Ca O in dry matter) of the herbage both from fields where the disorder occurred and where it did not occur approximates to unity, which is actually higher than the figure for lime of good quality pasture. In this respect both the moor areas and the uplands are alike. The great pre-ponderance of lime (Ca O) over phosphate (P_2O_5) in the case of all samples of herbage is noteworthy.

The phosphate status of the soil which supported the various samples of herbage examined is very low in all cases, the available phosphate being regarded as extra low or negative.

Further samples collected in the County of Offaly in the following season gave results which bore out those of the previous season. Those are presented in Table II which shows not alone the ash or mineral content of the herbage but also the organic constituents. Table II includes, in addition to both poor and good quality lands from Offaly, a few of the first-class grazing lands from Co. Meath and North Co. Dublin.

Table II.

Location and Type of Pasture	Ca O per cent.	P_2O_5 per cent.	Ratio Ca O to P_2O_5 per cent.	Cl. per cent.	Total Ash per cent.	Protein per cent.	Fat per cent.	Fibre per cent.	Nitrogen Free Extract per cent.
	Analyses of Pasture Samples From Offaly, Meath and Dublin (dry matter basis)								
Offaly : Moor *	1.32	.283	4.6 to 1	.30	6.68	11.63	1.88	25.05	54.76
,, ,, *	0.99	.322	3.2 to 1	.45	7.74	12.24	1.95	26.25	51.82
,, ,, *	1.31	.266	5 to 1	.46	7.50	9.53	2.28	27.11	53.58
Offaly : Upland *	1.97	.399	5 to 1	.68	9.90	10.85	1.85	25.16	52.24
,, ,, *	1.77	.391	4.5 to 1	.76	10.80	12.43	1.96	24.50	50.31
,, ,, *	1.40	.277	5 to 1	.48	10.42	9.09	1.93	25.63	52.93
Offaly : 2-year-old moor	1.19	.722	1.6 to 1	.83	8.79	19.00	1.98	24.28	45.95
,, 1- ,, ,, ...	1.20	.470	2.5 to 1	.76	8.10	12.51	1.58	25.68	52.13
,, 6- ,, ,, ...	1.37	.753	1.8 to 1	.86	8.47	17.49	1.46	21.73	50.85
Offaly : Good permanent pasture ..	1.32	.86	1.5 to 1	1.08	11.32	20.03	2.06	21.64	44.95
,, ,, ,, ...	1.17	.94	1.2 to 1	.85	10.50	20.82	2.23	20.93	45.52
,, ,, ,, ...	1.10	.98	1.1 to 1	.87	11.20	18.54	1.84	22.91	45.51
Meath : Prime Pasture	.87	1.17	0.8 to 1	1.23	11.03	19.59	1.54	23.75	44.09
,, ,, ,, ...	.80	1.19	1.7 to 1	1.44	11.68	23.09	1.67	23.03	40.53
Dublin : ,, ,, ...	.85	1.06	0.8 to 1	1.22	11.76	21.52	1.80	20.85	44.07
,, ,, ,, ...	.80	1.19	0.7 to 1	1.47	12.30	23.62	2.65	21.47	39.96

* indicates that "bog crook" occurs on these pastures.

The figures in Table II are very interesting. All samples are rich in lime, indeed the inferior pastures of Offaly contain as much lime as do the good permanent pastures, and both are actually richer in this nutritive factor than are the prime pastures of Meath and Dublin. The phosphate content of the Meath and Dublin pastures is higher than the lime content. The phosphate of the good permanent Offaly pastures, while greater than the average figure for permanent pastures, namely 0.67, as given by Orr (5), is less than that of the good Meath and Dublin pastures. Offaly moors recently laid down contain less phosphate than the good Offaly pastures, though in some cases at any rate, the phosphate content of the former is up to the standard of British cultivated pastures (6) namely 0.735. The Offaly moors recently laid down contain, however, much more phosphate than those Offaly pastures, whether moor or upland, on which "bog crook" developed in cattle. The similarity in respect of phosphate and the very low level of that ingredient in the herbage of both the upland and moory pastures on which animals developed "bog crook" is remarkable. The variation between the different types of herbage examined in respect of the lime to phosphate ratio is consequent on the percentage of phosphate and lime in the respective samples.

Taking the chlorine figures of the prime Meath and Dublin pastures as the basis of comparison, it is seen that the chlorine content of good Offaly pastures is less, and that of Offaly moors recently laid down less still than that of very good grazing land. The chlorine content of upland Offaly pastures on which "bog crook" occurs is lower than that of the temporary moory leys of Offaly, while the chlorine in the old Offaly moors on which "bog crook" occurs is least of all, being in fact only about one-third of that of the prime grazing lands of Meath and Dublin.

The figures for total ash are, of course, affected by percentage of phosphate and of lime in the respective samples. The figures for protein are remarkable. The protein of good permanent pastures from Offaly approximates to that of the prime pastures of Meath and Dublin. That of the herbage from Offaly cultivated moors (*i.e.*, laid down only a comparatively short time) is less. The protein content of all samples of herbage taken from pastures on which "bog crook" had developed, whether moor or upland, is decidedly low. In how far the parallelism between phosphate and protein figures may be correlated with the type of herbage is a matter for further investigation.

There is nothing about the figures for fat calling for comment, but in respect of fibre there is evidence of higher fibre in the inferior Offaly pastures than in the superior Offaly pastures or in the prime grazing lands of Meath and Dublin. Since the nitrogen-free-extract figures are obtainable by difference, any variation in respect of nitrogen-free-extract or soluble carbohydrates obviously occurs in respect of variation in the other constituents of the grass samples.

From Tables I and II it is apparent that cows which are confined to grazing herbage having a phosphate (P_2O_5) content of less than 0.4 per cent. develop pronounced symptoms of aphosphorosis.

The poverty of the pastures in regard to phosphorus as revealed by analysis of the herbage is not surprising in view of the deficiency of phosphorus in the soil analysis as shown in Table I. Extreme poverty of phosphorus exists in practically all soils examined, no soil showing more than an extra low test and many showing a negative balance for "available phosphoric acid." From the results presented it would be difficult to correlate the occurrence or non-occurrence of the disorder with the "available phosphoric acid" status of the soil. An extra low phosphate content or a negative phosphate balance has been found to be associated with the occurrence of the disorder in all except one case—sample No. 28. On the other hand, while the highest test obtained on soils where the disease did not occur was 8 lbs. per acre—sample No. 26, the disorder was manifest at this level in one case, namely sample No. 23. However it would be of little value to attempt to differentiate between soils showing a difference of only a few pounds per acre of available phosphoric acid. Actually all the soils for which phosphate figures are given in Table I are exceedingly deficient in available phosphate. According to the method of testing adopted, the figure 10 for "available phosphate" per acre would be interpreted as "very low" phosphate content.

Thus it would appear that the close relationship between the occurrence of the disorder in the animal and the phosphorus status of the pasture herbage cannot be further continued into the soil. Since the soils on which the disorder was not manifested do not show a significantly higher phosphorus status than the soils on which disorder did occur, it is of interest to enquire why the disorder did not occur in all cases. It was noted, however, that the occurrence of the disorder was generally associated with soils of a moory or semi-moory nature and not so much with upland soils. Indeed it has been the practice of farmers to remove affected animals from these low-lying soils to the better grass on the upland pasture where a recovery is often effected. A possible explanation is afforded by considering the rooting medium for the plants in the two soils. In the moor the herbage plants have only a very shallow impenetrable medium for root development with a consequently restricted area on which to draw for their mineral requirements. On the other hand, in the lighter upland soils of more open structure the roots have a much more free range and a greater area on which to draw for their phosphorus requirements giving on the whole a resultant greater percentage of phosphorus in the herbage of the upland soils. Added to this is the possibility of the better herbage on the upland soil having a higher selective power for phosphorus than has the inferior herbage of the moor.

In view of the calcium status of the grass, and of the fact that the soils in this area are underlain by a deposit of marl (practically pure calcium car-

bonate) it was decided that it was unnecessary to determine the calcium status of all soils. A few soils were taken at random and their acidity and exchangeable calcium content determined, and results are given in Table III.

TABLE III.

Name	Type of Soil	Acidity	Per Cent. Exchangeable Ca O
Richardson	Semi-moor	Slight	0.53
Moore	Moor	Moderate	0.39
Bagnall	,,	,,	0.36
Doyle	Upland	Strong	0.48
Fennel	Moor	,,	0.47

The number of soils examined in this manner was small but in view of the data presented above the possibility of the problem being complicated by a low calcium intake on the part of the animal is seen to be very remote.

Realising that the feed of cattle in winter consists, to a large degree, of dried fodder produced on the farm, samples were taken of the hay fed on farms whose history showed the yearly occurrence of "bog crook." For comparison, the hay from farms on which the disorder has not occurred was sampled. Table IV gives the percentage of phosphate in the hay from both groups of farms. Some figures available in the Animal Nutrition Laboratory, for the phosphate content of hay from other Irish sources are also given in the table as well as the figures for phosphate in hay taken from a British source.

TABLE IV.

Farm	Occurrence or Non-occurrence of Aphosphorosis	P_2O_5 in Hay (Per cent. in dry matter)
A : Offaly ..	Occurrence	0.25
B : ,,	,,	0.18
C : ,,	,,	0.22
D : ,,	,,	0.28
E : Offaly ..	Non-occurrence	0.38
F : ,,	,,	0.46
G : ,,	,,	0.44
Meadow hay—from Bull No. 48 of Br. Ministry of Agriculture Rations for Livestock ..		0.43
Seeds hay ,, ,, ,, ,, ..		0.60
Good meadow hay—from North Co. Dublin farms		0.60
Seed hay ,, ,, ,, ...		0.55
Meadow hay—from Co. Limerick farms		0.45

Table IV shows that the phosphate content of the hay fed on farms on which aphosphorosis occurred is appreciably lower than that of hay fed on neighbouring farms in which pronounced aphosphorosis has not occurred.

On the "affected" farms, not alone is the green herbage deficient in phosphate, but the dried herbage conserved for winter use shows a similar deficiency. This is as may be expected however in view of the general relationship between the phosphate in the herbage and that in the soil. Animals consuming the low phosphate hay from "affected" farms would, in order to ingest their daily requirements of phosphate, require to consume almost twice as much of this deficient fodder as they would of the richer phosphate fodder available on the neighbouring farms.

EFFECT OF APPLICATION OF PHOSPHATIC MANURE, (1945).

The application of phosphatic fertiliser to the land was obviously the next step in the investigation. Accordingly tests were begun to determine the effect of superphosphate on

(1) the flora of the herbage,
(2) the phosphate content of the herbage and soil,
(3) the grazing animal.

Two farms on which the "bog crook" disorder had occurred in previous seasons were selected. Portions of the pasture were dressed with superphosphate at the rate of 3, 6, and 9 cwts. per statute acre, respectively, untreated plots being left for purposes of comparison. The manure was applied in mid-April, 1945.

(1) THE FLORA OF THE HERBAGE.

Prior to the application of the phosphatic manure the herbage was made up of a mixture of crested dog's tail, yorkshire fog, sedges, moss, knapweed, selfheal and other weeds. There was no obvious evidence of clover nor of the better grasses. Subsequent to the manurial treatment clover became much in evidence, and the growth of herbage was not alone more rapid than in the unmanured plots, but there appeared an increase in the grasses, in particular perennial rye grass and meadow fescue among the species. The grazing animals paid much more attention to the manured than to the undressed or control plots.

(2) PHOSPHATE OF HERBAGE AND SOIL.

Samples of herbage were collected in August and again in November from the dressed and the undressed or control plots, and as may be seen from the figures on Table V, there occurred at both centres an appreciable increase in the phosphate content of the herbage as a result of applying the phosphatic fertiliser. In comparison with the control or undressed plot, the percentage of phosphate in the herbage increased progressively with the application of increasing quantities of fertiliser to the soil in the case of centre 1. In centre 2 there occurred the same tendency but to a less marked degree.

Table V.

Centre	Rate of application of superphosphate (per acre)	Phosphate (P_2O_5) in herbage		Available phosphate (P_2O_5) in soil			Available phosphate (P_2O_5) in soil				
		Time of Collection of sample	Per cent.	Time of Collection of sample	In layer of soil between levels of 2" and 6" below the surface of the ground		Time of Collection of sample	In layer of soil between levels of 2" and 4" below the surface of the ground		In layer of soil between levels of 4" and 6" below the surface of the ground	
					lb. per acre	Considered as		lb. per acre	Considered as	lb. per acre	Considered as
1.	Control 0 cwts.	August, 1945 November, 1945	0.26 0.30	October, 1945	less than 2	Negative	March, 1946	less than $2\frac{2}{3}$	Negative	less than $2\frac{2}{3}$	Negative
	3 cwts.	August, 1945 November, 1945	0.50 0.60	October, 1945	4	Extra low	March, 1946	less than $2\frac{2}{3}$	Negative	0	Negative
	6 cwts.	August, 1945 November, 1945	0.70 0.68	October, 1945	less than 2	Negative	March, 1946	4	Extra low	$2\frac{2}{3}$	Extra low
	9 cwts.	August, 1945 November, 1945	0.83 0.83	October, 1945	4	Extra low	March, 1946	$2\frac{2}{3}$	Extra low	$2\frac{2}{3}$	Extra low
2.	Control 0 cwts.	August, 1945 November, 1945	0.29 0.29	October, 1945	less than $2\frac{2}{3}$	Negative	March, 1946	$2\frac{2}{3}$	Extra low	$2\frac{2}{3}$	Extra low
	3 cwts.	August, 1945 November, 1945	0.42 0.28	October, 1945	less than $2\frac{2}{3}$	Negative	March, 1946	4	Extra low	4	Extra low
	6 cwts.	August, 1945 November, 1945	0.48 0.62	October, 1945	4	Extra low	March, 1946	4	Extra low	$2\frac{2}{3}$	Extra low
	9 cwts.	August, 1945 November, 1945	0.57 0.58	October, 1945	less than $2\frac{2}{3}$	Negative	March, 1946	$6\frac{2}{3}$	Extra low	$2\frac{2}{3}$	Extra low

Table V also gives results of soil analyses which indicate no appreciable increase in the available phosphate of the soil six months after the application was made, *i.e.* in October, 1945. It would appear as if in the meantime the phosphate was immobilised by the acid peaty soil, or alternatively that the manures applied were located in the top soil. To test this latter hypothesis further samples of soil were taken and analysed five months later, *i.e.* in March, 1946. On this occasion, however, the top two inches of soil, *i.e.* immediately below the grass roots (soil two inches to four inches deep) and the two-inch layer beneath this again (soil 4 inches to 6 inches deep) were taken and analysed separately. Table V shows that in respect of these results it would appear from centre 2, as if there was greater concentration of phosphate near the surface of the ground as a result of applying phosphatic manure. This result is not borne out by the figures from centre 1, however.

(3) RESPONSE OF GRAZING ANIMAL.

About the middle of June, in the case of centre 1, and early in July in centre 2, cattle which had been grazing on unmanured portions of the farms and which in both cases had begun to show pronounced symptoms of aphosphorosis were introduced into the fields which had been dressed in mid-April with phosphates. The results are set out hereunder.

Centre 1.

The animals from the beginning showed a decided preference for the phosphate-dressed plots, the controls remaining uneaten during the grazing period. On entering the moor it was possible to see the control plots at a glance, as the manured portion was well grazed all round them. Recovery of the animals took place in one month, all signs of stiffness and lameness having completely disappeared, the skin became loose and the condition of the beasts improved. There was an increase in milk yields. One of the cows would probably have gone dry, were it not for the fact that phosphate-dressed pasture was available.

The animals came "in season" and were mated in August. This is noteworthy, as it was common for cows on this farm to go two years or more without producing a calf. Incidentally this proved to be the first occasion on which the necessity to hand-feed and house the cows at night during the summer did not arise, and it marked the first summer for a very long time on this farm, for the cows to recover from the disorder on the pasture.

Centre 2.

As in Centre No. 1, the animals showed a decided preference for the phosphate-dressed plots, the control areas being left uneaten. Again it was possible to see the controls at a glance on entering the moor. Though it was

customary for cows on this farm to carry on for fifteen months after calving before coming "in season" those grazed on the phosphate-manured ground were actually mated a month after going on to it and some six months after calving.

It was only a matter of weeks before the stiffness and other symptoms of aphosphorosis disappeared. The condition of the cows rapidly improved, milk yields went up, a considerable increase in body weight took place, and the dull drab coats took on a much more pronounced colour. This change of colour was particularly noticeable in the case of certain cattle which developed a blood-red colour from what was a pale reddish brown.

The other cows on the farm which were not given access to the phosphate-dressed pasture continued to show the symptoms of the disorder—depraved appetite, stiffness, emaciation, very low milk yield, etc.

EFFECT OF APPLICATION OF PHOSPHATIC MANURE TO PASTURE (1946).

As in 1945 tests were made in 1946 to determine the effect

(1) on the flora of the pasture,
(2) on the phosphate content of the pasture herbage,
(3) on the grazing animal,

of applying phosphatic fertiliser - superphosphate—to pastures on which "bog crook" had occurred in previous years. The manure was applied in spring.

(1) FLORA OF THE PASTURE.

Examination of the type of herbage carried by the manured and untreated plots was conducted in September. The results were similar to those obtained in 1945.

(2) PHOSPHATE CONTENT OF HERBAGE AND SOIL.

The phosphatic manure was applied at eight centres and the quantities used, together with the effect on the herbage and soil as compared with control undressed plots, are given in Table VI which also gives the pH of the soil.

TABLE VI.

Centre	Sample No.	Superphosphate applied per acre (cwts.)	Phosphate (P_2O_5) in the herbage (per cent.)	Available phosphate per acre of soil (lb.)	Phosphate status of soil	pH of soil
A	1	0	0.467	16	very low	6.2
	2	1	0.627	16	very low	6.9
B	3	0	0.323	8	very low	6.6
	4	1	0.498	12	very low	6.0
C	5	0	0.389	16	very low	5.8
	6	2	0.467	28	low	5.8
D	7	0	0.422	28	low	6.0
	8	2	0.788	36	low-medium	6.0
E	9	0	0.239	12	very low	5.9
	10	4	0.546	12	very low	5.9
F	11	0	0.348	20	low	6.0
	12	4	0.716	48	medium	5.8
G	13	0	0.348			
	14	3	0.573			
	15	6	0.726			
	16	9	0.760			
H	17	0	0.296			
	18	3	0.511			
	19	6	0.702			
	20	9	0.760			

The figures in Table VI show that an increase in the phosphate content of the herbage occurred at all centres as a result of applying the phosphatic fertiliser. The degree of response varied, however, as between the different centres. At centres G and H, 6 cwts. of superphosphate per acre had an appreciably greater effect than had 3 cwts. The available phosphate in the soil increased in four cases out of six as a result of the application of phosphate as a fertiliser, the absence of increase in two cases being apparently connected with the phenomenon of immobilisation of the fertiliser in the soil, in which cases a heavier application of fertiliser is necessary.

(3) RESPONSE OF GRAZING ANIMALS.

During the summer, cows, which on the untreated pastures had developed symptoms of aphosphorosis, were put to graze on the areas treated with superphosphate at centres A, B, C, D, and E. Recovery took place at the centres A, D, and E but not at centres B and C where apparently the phosphate content of the herbage was still too low to provide in the daily intake of herbage by the cow, sufficient of this factor to meet her daily current

requirements together with that required to remedy the previous aphosphorosis condition. Actually the cows at centres B and C recovered later when fed meat-and-bone meal. At centre F the manured plots were grazed by yearling cattle which made good progress and looked thrifty and in excellent health during the grazing period.

EFFECT ON CEREALS OF THE APPLICATION OF PHOSPHATIC FERTILISER TO THE SOIL.

At five centres superphosphate was applied to the land at the time of planting the cereal crop, and, at harvest, samples of grain and of straw were collected both from the manured plots and from adjoining unmanured plots. The appearance of the comparable plots was noted before cutting took place. The relevant details are given in Table VII.

TABLE VII.

Cereal grown	Centre	Increase in size and weight of cereal crop as a result of the application of fertiliser	Phosphate (P_2O_5)		
				in grain per cent.	in straw per cent.
Barley	1	Nil	Control plot Manured ground	0.62 0.65	0.13 0.14
Wheat	2	Nil	Control plot Manured ground	0.77 0.78	0.22 0.22
Oats	3	Slight	Control plot Manured ground	0.73 0.74	0.15 0.20
Wheat	4	Slight	Control plot Manured ground	0.74 0.76	0.14 0.17
Oats	5	Very considerable	Control plot Manured ground	0.60 0.67	0.14 0.27

It will be noted that manurial treatment with phosphate did not materially change the phosphate content of the grain whether or not the fertiliser increased the weight and size of the crop. When the yield (size and weight) of cereal was increased considerably there was a very material increase in the phosphate content of the straw; when the increase in yield was slight there was a small increase in the phosphate of the straw; when no increase in yield of crop took place as a result of the fertiliser application the percentage of phosphate in the straw was not altered.

MILK YIELD: EFFECT OF FEEDING PHOSPHATES AND OF MANURING LAND WITH PHOSPHATES.

As already stated, one of the pronounced effects of increasing the phosphate intake by milking cows suffering from aphosphorosis was a raising of the milk yield. This occurred in the case of affected animals whether the increased intake of phosphate was brought about either by feeding supplementary phosphates or by grazing the stock on land to which phosphate had been applied. The degree of response in the form of increased milk yield naturally depends on the stage of lactation, cows in early lactation responding to a greater degree than those in late lactation.

Figure 5 is illustrative of a typical result. In this case the cows were three months calved when the test began.

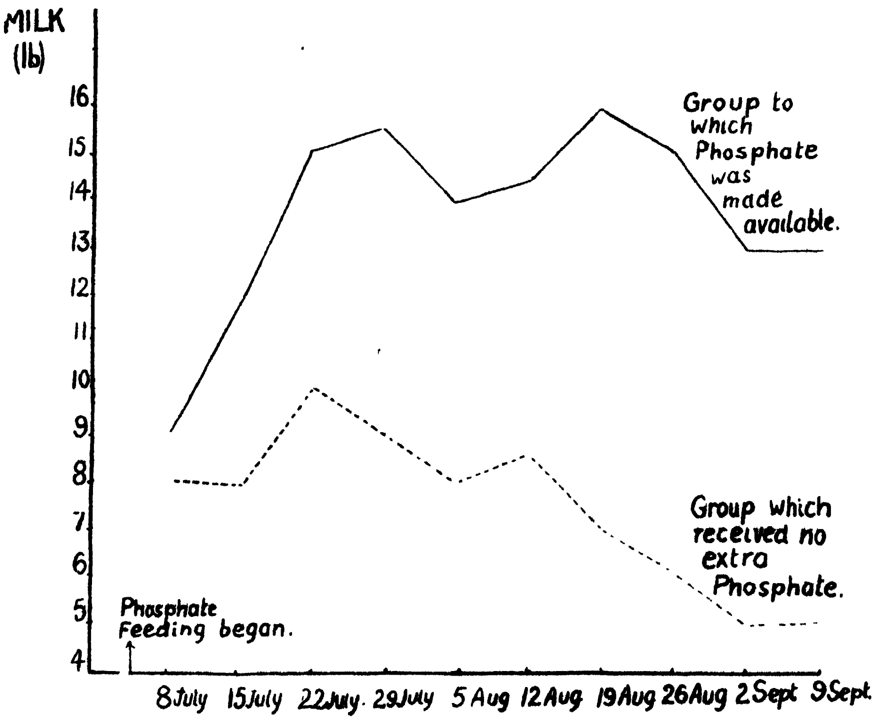

Figure 5. Effect on milk yield of increasing the phosphate intake of the cow grazing phosphate-deficient pasture.

In addition to giving so much extra milk it will be noted that the treated cows recovered from the disorder, all the symptoms of aphosphorosis having disappeared.

EFFECT OF PHOSPHATE DEFICIENCY ON THE GROWTH AND PROGRESS OF YOUNG STOCK.

In those widespread areas in Offaly where aphosphorosis is in evidence, the young cattle, as seen on the farms and at fairs are of comparatively small stature giving a priori evidence of a deficient diet. Whether the deficiency is one of phosphate alone or of a number of food factors has not yet been determined. The analysis of phosphate deficient pastures as revealed in this report would suggest a shortage not alone of phosphate but also of protein. and possibly of salt, and possibly also an insufficient intake of digestible food by calves and young stock from the deficient pastures. It is to be noted however, that on pastures where milking cows develop the symptoms of aphosphorosis described in the earlier portion of this report, calves and young stock do not usually show the same pronounced symptoms of disorder. Presumably this is explained by the sub-normal rate of growth. Farmers have learned that by temporarily moving the young stock to other grazing they maintain them apparently healthy. The change of grazing together with the supplementary foods used by calves and young cattle usually prevent the development, in those areas, of the aphosphorosis symptoms seen in dairy cows. Nevertheless the stunted appearance and small stature give abundant evidence of deficiency in the diet of the young cattle stock. Further experimental work for the purpose of collecting data on aphosphorosis in young stock is in progress and the results will be presented in a later report.

DISCUSSION.

From the point of view of plant growth it is recognised that phosphatic fertiliser in considerable quantity is required over large areas of the land of this country. The data presented in this paper reveal the fact that in the county of Offaly, and presumably in several other counties also, much of the pasture herbage contains a proportion of phosphorus which is definitely below that required by cattle stock for health and normal development and production. As demonstrated by Theiler, Green and Du Toit (1) (7) phosphorus has a "functional as well as a structural rôle in cellular metabolism." Hence the multiple symptoms of disorder apparent in cattle suffering from aphosphorosis. Because of the large draft on blood phosphorus consequent on lactation the symptoms become more pronounced in the case of milking cows than in other cattle. There is evidence, however, of the serious ill-effects of deficiency of phosphorus in the case of young cattle also.

A deficiency of phosphate in the herbage has less serious consequences on sheep because of their smaller frame and because also of their more selective

grazing habits. According to Marston (8) cattle require about two-and-a-half times as much phosphate as do sheep in the grazing herbage. His evidence is to the effect that while pasture herbage containing not less than 0.4 per cent. of phosphate may not produce any disorder in sheep, at least 0.8 per cent. of phosphate in the herbage is required for good health and production by cattle. The moors and some upland pastures in Offaly contain much less than 0.4 per cent. of phosphate. Cattle on these pastures develop pronounced symptoms of aphosphorosis.

The development of the symptoms of aphosphorosis described in this paper represents extreme poverty of phosphorus. Bone chewing is an early symptom, but the minimum intake of sufficient phosphate to prevent bone chewing falls short of the optimum amount of phosphate necessary for full metabolic requirements (7). Thus there may be ill-health and poor progress without pronounced or specific disease. This condition of sub-normal health is probably the most widespread in this country. It applies to cattle in many areas, and in certain localities, probably to sheep and horses also.

In those parts of Offaly where "bog crook" abounds a type of stiffness known as "chest founder" sometimes occurs in horses. The stiffness in cows showing aphosphorosis ("bog crook") sometimes affects the fore part of the body most seriously, and it may be that the "chest founder" in the horse is a similar manifestation of aphosphorosis in that animal.

In the case of the dairy cow restoration to health of affected animals is effected by feeding supplementary phosphate *per se*, or in the form of a food rich in phosphate such as sterilised bone flour or meat-and-bone meal. Restoration to health is also effected by grazing the cows on pastures previously treated with a phosphatic fertiliser. The comparative efficacy of the two methods has not been studied but it is significant that the protein of "bog crook pastures" whether of the moory or upland type is very much lower than that of pastures on which the disorder does not occur. The same applies in as far as chlorine is concerned. On the other hand the protein and chlorine of recently laid down moory pastures, presumably manured while in tillage, are very much higher, and approach the level found in good fertile pastures. While awaiting the results of further investigation it is presumed that a secondary result of the application of phosphatic fertiliser to pasture badly needing it is the raising of the protein content of the herbage and probably of the chlorine also. There is, of course, abundant proof of the raising of the phosphate content both of grass and cereal straw as a result of applying phosphate to phosphate-deficient land. The very low protein content of phosphate deficient pasture herbage would, no doubt, act as a limiting factor to milk production in cows, and to growth in young stock even when a supplement of phosphate is fed. For best results a phosphate

supplement should be accompanied by a supplement of protein and of salt (sodium chloride). In the absence of the protein and salt supplements the feeding of extra phosphate, as determined by the criteria of milk yield and growth would presumably give results inferior to those forthcoming from an application of phosphatic fertiliser to the pasture. Marston's results (9) in this connection are interesting. The provision of phosphate lick to sheep grazing an area very deficient in phosphate gave negative results, while top dressing with phosphate produced beneficial effects on the sheep. Presumably in that case the daily protein intake of the sheep on the dressed plots was considerably greater than that from the undressed plots, though conceivably Marston's results may be otherwise explained.

Certain of the symptoms of aphosphorosis described in this paper are specific to this disorder. Others, however, are common to a number of conditions. Pica or depraved appetite, for instance, occurs when there is a shortage of phosphate or sodium chloride or cobalt in the diet. The tendency to constipation is common in most cases of deficiency and occurs when cobalt, calcium or vitamin B is deficient. Infertility is a common symptom of dietary deficiency.

SUMMARY

Evidence is presented of the widespread occurrence of aphosphorosis in dairy cows, and presumably in young cattle also, in the county of Offaly, where the disorder, accompanied by the typical symptoms, occurs chiefly on moory pastures and to a lesser extent on upland pastures. The consequent losses to stockowners are of very serious dimensions. The herbage grazed by affected stock, though rich in lime, is abnormally low in phosphate, and the underlying soil is exceedingly low in available phosphate. Accordingly the incidence of the disorder is worst in summer, farmers finding it possible to alleviate the condition to some extent by feeding phosphate-rich foods such as bran and cereals. Even the winter feeding on the phosphate-deficient farms provides an inadequate supply of phosphate for stock requirements because of the poverty of the hay, and straw also, in this essential food factor.

Offaly pastures which are deficient in phosphate show a serious deficiency in protein also, as well as in chlorine, factors which no doubt contribute to low productivity, though not to the pronounced condition of aphosphorosis.

The feeding of a phosphate compound or of meals rich in phosphate causes the pronounced symptoms of aphosphorosis to disappear from dairy cows in from four to ten weeks according to the severity of the condition. A compound mineral mixture is for this purpose no more effective than the phosphate alone. The restoration to health and the improvement in milk yield consequent on the feeding of supplementary phosphate are equally effected by

prior application of phosphatic fertiliser to the pasture, the phosphate content of which, as well as of the hay made therefrom, is thereby raised.

Land of the type on which aphosphorosis freely occurs produces, when laid down to grass after a rotation of crops, some of which are manured, a type of herbage which in respect of phosphate, protein and chlorine approaches or reaches the level of these food factors found in good quality grazing land. Where phosphatic fertiliser increases the yield of cereals it also raises the phosphate content of the straw.

While the losses due to pronounced aphosphorosis are obvious, those accruing from border-line health, slow growth, and low productivity among stock, arising from insufficient phosphate intake, are, though less apparent, much greater on the whole because of their more widespread occurrence.

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OAT BREEDING AT THE ALBERT AGRICULTURAL COLLEGE 1907-1947

By

M. CAFFREY, B.Sc., Plant Breeding Department, University College, Dublin.

In previous issues of this *Journal** papers were published dealing with certain new oat varieties which were bred and distributed to farmers in this country. These papers were confined, in the main, to descriptions of the varieties dealt with, together with a record of their performances in small and large scale experimental plots. They did not give a detailed and connected account of the oat-breeding work carried out at the Albert Agricultural College in its entirety, nor did they deal with the various lines of investigation which were evolved in the full development of the oat-breeding programme. It is, therefore, desirable that a review should now be attempted, which, setting out from its beginnings in the early years of the present century, would give an orderly record of the progress which had been made in the production and propagation of new, prolific and well-adapted varieties at the College.

THE POSITION IN 1907.

Forty years ago the oat varieties most widely grown in this country were Black Tartary and Potato. Black Tartary was the leading variety in the eastern districts, the great central plain and in the south, whilst Potato—with some of its allied varieties like Sandy—was dominant in the west and north. Both were well adapted to the soil and climatic conditions, and although the yield and quality of the grain produce was not high—judging by present standards—they produced an abundance of straw which was regarded as of high feeding value for young stock. The fineness and high quality of the straw of these varieties rendered them liable to lodge on heavy rich soils, if unfavourable weather conditions were experienced before harvest.

The time had arrived, however, when the demand for new and improved oat types became insistent. Farming in this country was on the upgrade. The land was being better tilled. Artificial manures were being used more abundantly and more scientifically, not only on tillage crops, but also on grasslands. The value of wild white clover in increasing the yields of pastures and in building up the fertility of the soil had been discovered. The use of indigenous strains of grasses and clovers in the right proportions enabled

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farmers in many areas to adopt the system of ley farming so as to cash, at periodic intervals, the accumulated fertility of their pastures in the production of tillage crops. These developments which were brought to the notice of Irish farmers through the activities of the newly created Department of Agriculture had the double effect of stressing the need for the provision of improved new oat and other cereal varieties and of diminishing the importance of oat straw as a food for young cattle.

ESTABLISHMENT OF THE SEED PROPAGATION DIVISION.

In order to meet this demand the Department of Agriculture set up in 1904 its Seed Propagation Division. The objectives in the case of oat-breeding were clear: higher yields, large plump grain of high bushel weight, greater strength of straw, and better adaptation for growing under our soil and conditions. The methods to be used were equally clear. They were:

1. The production by single plant selection of the most valuable strains of the varieties then being grown in this country and their immediate distribution to farmers;

2. The importation of new varieties of oats of outstanding importance in their countries of origin with the view to testing their performance when grown in this country, and subsequently, of using them either directly or as sources of superior germ plasm in breeding;

3. The production by hybridization and subsequent selection of new types combining in a high degree the good qualities of those varieties and strains which were shown to have characters of economic importance.

Accordingly pedigree strains of Black Tartary, Potato, Sandy, Abundance, Waverley and other commercial varieties were produced, propagated and put on the Irish market and new varieties imported from Great Britain, Sweden, Canada, Denmark and Holland and tested out in small and large scale experimental plots.

VICTORY OATS.

The introduction, in the year 1910, of Victory oats from the Plant Breeding Institute at Svalöf, Sweden, was an important event in the history of Irish tillage farming. This oats was derived by single plant selection from Probsteier, an old land variety which at that time was extensively grown in Scandinavia and on the north western European mainland. It marked a distinct advance on any oat variety previously available to Irish farmers. It could be grown on a wide range of soils. It yielded well, the grain was

Ears of Glasnevin Triumph Oats

large, plump, cream in colour and of high bushel weight and the straw although liable to lodge on rich soils stood better than either Black Tartary or Potato. In fine, it was an excellent variety measuring up to the highest standards in all economic characters with the exception of the strength of its straw.

It was no wonder, therefore, that Victory oats soon rivalled and then surpassed Black Tartary in popularity. It also replaced Potato oats in the more fertile areas. On poor soils, however, and particularly on the western and north western seaboard Potato still held its own and does so to the present day. Apparently the soil conditions in these particular districts are more suited to the production of heavy crops of Potato and its related varieties than they are to the newer types which demand a somewhat higher nutritional status for maximum productivity.

A study of the characteristics of the indigenous and imported varieties and of their performances under soil and climatic conditions showed that no variety had a monopoly of desirable characters. Thus, Victory had good grain quality and high potential yielding capacity; Banner had superior strength of straw but the grain had not the quality of Victory. Potato and Black Tartary tillered well. It was clear that these and other characters were heritable. The possibility, therefore, existed of combining them, by means of hybridization, in new hybrid forms which might prove to be of superior value to the parent varieties for cultivation on Irish soils.

It is necessary to emphasise here that the production of new varieties through hybridization, followed by selection among the hybrid progeny, is a tedious process. It takes a number of years before derivates breeding reasonably true to type are obtained. These have to be multiplied, tested in small and large scale quantitative experiments over a number of years and in different types of soil before their value can be assessed. Only then is it desirable to multiply them for large scale distribution. All these operations are time consuming and experience has shown that it takes from ten to fifteen years before derivates from any particular cross are made available to farmers. It is not, therefore, to be wondered at that the first hybrid oat variety which was derived from a crossing made in 1911 was not made available until about the year 1926.

VICTORY 2.

In the meantime a most promising new hybrid variety was obtained from Sweden. In the autumn of 1920 the writer obtained a small stock of hybrid oats from Svalöf. This was the progeny of a cross made many years previously between Victory and *Gul Naesgaard*—a yellow grained oats. This was grown the on Albert College farm in 1921 and a number of single plant selections were made from the ripe crop previous to harvest. These were multiplied

and tested in small scale trials in 1923 and 1924. The most prolific strain which was named Victory 2 was rapidly increased and was eventually tested against Victory throughout the country by the Agricultural Instructors during the years 1926 and 1927. The results of these experiments in respect of the yields of grain and straw are set out in the following Table. The yields are per statute acre.

TABLE I.

Variety	1926 28 Centres				1927 24 Centres			
	Grain		Straw		Grain		Straw	
	cwts.	qrs.	cwts.	qrs.	cwts.	qrs.	cwts.	qrs.
Victory 2	24	2	36	0	23	3	37	0
Victory	23	3	34	3	22	2	36	0

It will be seen that Victory 2 gave a satisfactory increase as regards both grain and straw over Victory. As the quality of the grain and the standing capacity of the straw of Victory 2 was fully equal to Victory, it gradually replaced the latter variety and has for many years been the leading commercial variety in this country on soils of average fertility.

GLASNEVIN SONAS.

The first of the new hybrids raised by the Seed Propagation Division to be released for general cultivation in Ireland was Glasnevin Sonas. It was derived from a cross, made in 1911, between a pedigree strain of Black Tartary and Banner. In the field trials conducted in the Albert College farms during the years 1923-25 inclusive it outyielded Victory 2 by no less than two barrels and six stones per statute acre. In addition it proved to be distinctly more resistant to lodging than any of the varieties under test on the College farms. In subsequent trials conducted throughout the country its superiority over all other varieties in respect of strength of straw was confirmed. Moreover, it outyielded Victory and Victory 2 on rich and average soils, but was inferior to them in this respect on poor soils. It had also the remarkable characteristic of being highly resistant to attacks of Leaf Stripe disease (*H. Avenæ*).

Further experience in the cultivation of Glasnevin Sonas showed that it had some disadvantages which militated against its widespread cultivation throughout the country. It was late in ripening—a serious disadvantage in many areas. The grain was smaller than Victory 2 and gave a large proportion of 'seconds.' Many attempts were made by single plant selections to improve

the size and plumpness of the grain but with little success. Fortunately, however, Glasnevin Sonas has proved to be an excellent variety for crossing purposes, and many of the derivatives have produced grain of good grain quality.

ESTABLISHMENT OF THE FACULTY OF AGRICULTURE IN UNIVERSITY COLLEGE, DUBLIN.

Soon after the introduction of Glasnevin Sonas the Albert Agricultural College, together with its lands, buildings, equipment and stock were transferred to University College, Dublin, in accordance with the provisions of the University Education (Agriculture and Dairy Science) Act, 1926, and from that date the plant breeding work carried out at Glasnevin came under the control of University College.

New buildings equipped with seed cleaning and dressing machines were erected, additional staff was provided, and the work was extended to include the breeding of grasses and clovers. It is pleasant to place on record that the new University Plant Breeding Department had from the outset the closest and friendliest co-operation with the State Department of Agriculture, which provided, and still continues to provide, the fullest facilities in connection with the laying down and carrying out of field experiments with the new varieties and strains raised at Glasnevin. Without this co-operation it would not have been possible for the Plant Breeding Department of U.C.D. to determine the suitability of these new forms for general cultivation in Ireland.

GLASNEVIN SUCCESS.

This variety was derived from a cross between Victory 2 and Record. It is an early maturing type. The grain is large and of good average quality. The straw is short and resistant to lodging on good soils; it has outyielded Victory 2 by significant amounts. It has proved to be well suited for cultivation in late districts and is now a well established and popular variety. Recently an improved strain of Glasnevin Success (No. 10) has been put on the market. It is slightly superior to the original strain in yielding capacity and grain quality.

GLASNEVIN ARDRI.

It was mentioned above that Glasnevin Sonas although unexcelled for yield of grain per acre and for lodging resistance, fell below the highest standards as regards time of maturity and particularly in regard to the size and quality of the grain produce, and that moreover, single plants selections

within the variety failed to remedy these defects. It was therefore crossed with Victory 2 and other commercial varieties in order to obtain new types having the quadruple combination; high yield, strong straw, good quality grain and early maturity. The derivatives obtained from the Glasnevin Sonas—Victory 2 cross displayed these characteristics in a high degree and eventually one of these was put on the market under the name of Glasnevin Ardri. This particular hybrid proved to be significantly superior in yielding capacity to Victory 2, Glasnevin Sonas, Elder, Onward, Binder, Eagle, and equal to Glasnevin Success No. 10, in the small scale trials conducted on the College farms during the years 1933 to 1938 inclusive.

The grain of Glasnevin Ardri although slightly inferior to Victory 2 in size was superior to that of Glasnevin Sonas. It ripens at the same time as Victory 2. The lodging resistance capacity of the straw was good. Altogether it was a very valuable variety for cultivation and it is now widely grown in this country.

In many areas, notably in Co. Roscommon, farmers led by their Agricultural Instructors have arranged for its extensive cultivation and have installed the necessary machinery for the cleaning and dressing of the grain. In this way they have not only increased their crop yields but have been able to secure the enhanced prices obtained from the sale of the produce for seed purposes.

GLASNEVIN TRIUMPH.

Having secured the two outstanding well adapted varieties, Glasnevin Success No. 10 and Glasnevin Ardri, it was but natural to cross them in the hope of securing a new form which would be superior to both parents in economic characters, and which would be capable of replacing both in large scale propagation. The cross gave many interesting derivatives, mostly resembling Ardri, and eventually a pure breeding form was obtained which in addition to retaining the best characters of Ardri was earlier in ripening and produced grain equal to Victory 2 in size, quality and bushel weight. This new hybrid, which was named Glasnevin Triumph, was grown in observation plots throughout the country in 1946. It will be remembered that the harvest of that year was the worst experienced for a generation. Wet stormy weather set in during the latter half of July and continued without intermission up to the end of September. In spite of this, field plots of Glasnevin Triumph stood up remarkably well and the heavy field crop grown on the Albert College was cut with the binder, whereas contiguous plots of Victory 2 and Potato were hopelessly lodged.

Considerable areas of this new variety have been grown during the present year (1947) and reports received from all areas indicate that it is well adapted

for cultivation under the soil and climatic conditions prevailing in this country. Some growers have expressed the view that it represents a considerable advance on any variety previously introduced.

As this variety is mentioned for the first time in the literature it is desirable to describe it :—

Origin.—Product of a cross between Glasnevin Ardri and Glasnevin Success made at Albert Agricultural College, 1932.

Plant Characters.—Leaves medium wide, dark green, glabrous. Straw mid-tall, strong, upper nodes glabrous.

Panicle Characters.—Size, large, semi-unilateral when ripe. Spikelets, pendulous generally two-grained. Glumes, yellow-large.

Grain Characters.—Shape, broad, blunt. Basal hairs absent. Crease, slightly hollow. Colour, cream, shiny occasional awns. Rachilla, medium long, glabrous.

Agricultural Characters.—Maturity, medium, ripens two-three days earlier than Glasnevin Ardri. Yield high. Straw strong.

BREEDING OF ADAPTED STRAINS OF POTATO OATS.

Potato oats has successfully withstood the competition of the newer varieties in the western areas and in inland districts where the soil is of low fertility. In order to meet the needs of growers of this variety, a number of pedigree strains have been produced and distributed to farmers in the 'Potato' growing areas. The first was a selection from a Kentish stock and was known as Kent Birlie. It had small grain and the yield was comparatively low. It was replaced by a pedigree selection of Irish grown commercial Potato. This was an improvement on Kent Birlie, but within recent years it has in turn been replaced by a third strain—Potato (Ardee). The latter was produced by single plant selection from a small stock of Potato Oats which was reported to be doing well in the Ardee district (Co. Louth). Potato (Ardee) has strong straw, an early ripening habit and the grain is large and of excellent quality. It is now widely grown. During the past few years a fourth strain of Potato has been developed. The grain is pink in colour. The straw is comparatively tall and it may replace Sandy and other old land types which are still grown on very poor soils.

Numerous crossings between Potato and the leading large grain commercial varieties have been made, but so far none of the Potato-type derivatives from direct crosses have been of any economic importance. Recently the

'back cross' method has been adopted. Binder was crossed with Potato and in the second filial generation a derivative which resembled Potato oats as regards growth habit and type of inflorescence but with short straw was crossed back to the original Potato. Some of the derivatives from this backcross have now been obtained breeding true to type and they will be included in small scale experiments as soon as possible.

RECENT BREEDING WORK.

Since the introduction of Glasnevin Triumph, efforts have been made to produce new varieties excelling in the size and quality of the grain. The most promising derivatives in respect of these characters have been obtained from Triumph and Star and from Binder-Onward X Star. These derivatives are now breeding true to type. The weight and composition of well dressed samples of this grain are shown in comparison with Victory 2, Glasnevin Triumph and Glasnevin Ardri in the following Table.

Variety	Wt. of 1,000 corns	Per cent. of Kernal
	grams	
Glasnevin Ardri	42.1	73
Glasnevin Triumph	44.0	72
Victory 2	44.2	73
Binder-Onward Star No. 5	48.5	72
Triumph Star No. 1	48.5	75

The best Triumph Star derivative is exceptionally promising, for in addition to its high grain quality it grows rapidly in the early stages of its development and ripens as early as Glasnevin Success. Its yielding capacity has not yet been determined.

SEED PROPAGATION AND DISTRIBUTION.

The maintenance of healthy genuine mother stocks of all the leading oat varieties grown by Irish farmers is an essential feature of the programme of the Plant Breeding Department. The pedigree system has been adopted, that is stocks of all the varieties being propagated are derived from single plant selections. The successive progenies of single plants up to and including the field plot stage are grown on the Albert Agricultural College farms. The progenies of field plots are handed over to the Department of Agriculture

which propagates them a stage further on the Department's farms. Subsequently they are handed over to a seed-growing organisation which arranges for their large scale propagation and distribution to farmers. In this way farmers are assured of adequate supplies of pedigree seed annually at a reasonable cost.

SUMMARY.

A connected account is given of the investigations leading up to the production of Victory, Victory 2, Glasnevin Sonas, Glasnevin Success, Glasnevin Ardri, Glasnevin Triumph and Potato oats, and the methods employed in the production and distribution of these and other varieties are briefly described.

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BREEDING FOR DISEASE RESISTANCE

By

M. CAFFREY, B.Sc., Plant Breeding Department, University College, Dublin.

References have frequently been made in the literature to the incidence of disease among farm and garden crops and various recommendations have, from time to time, been suggested regarding the best means of dealing with this grave problem. Experience has shown that the efficient control of any widespread and serious disease whether it be caused by bacteria, fungi, virus, insect pests or by deficiency or excess of some essential element or elements in the food supply is difficult and the prevailing view now is that it can best be attempted by a team of experts in the various biological sciences working under the direction of an able and inspiring leader.

It is believed that a review of the progress which has been made in the control of certain crop diseases would be of direct interest to the growers of these crops. It should also interest those who are concerned with livestock production, because plant life in its fundamental organization, its cellular system, the physical and chemical constitution of its chromosomes, its type of cell growth and cell division and its methods of reproduction is essentially similar to animal life. It is reasonable therefore, to expect that the principles which have been successfully applied to the production and large scale propagation of disease resistant plant varieties might, with appropriate modifications, be applied in the production of healthy strains of farm animals.

This review will be confined to a description of some of the investigations which have led to the control of certain plant diseases by the *breeding* of resistant varieties and strains. It is recognised that there are other methods of control, for example, by seed and crop disinfection, but in the case of many crop diseases, notably the rusts, these latter methods cannot be successfully employed.

DEVELOPMENT OF NATURAL RESISTANCE TO ATTACK.

Most of our crops have been in existence for extremely long periods of time and although they have been ceaselessly attacked by diseases of various kinds they have been able to maintain themselves. It is clear therefore, that all surviving plant species have evolved mechanisms which enable them to develop a natural resistance to the parasites which attack them. Furthermore,

these mechanisms are heritable. These depend mainly on the Mendelian factors or genes which determine and control the expression of the various botanical characters possessed by individual plants.

Genes occasionally change their nature or in scientific terms they mutate through the operation of causes which we are now beginning to understand. A mutated gene may profoundly affect the characters of the organism in which it is present. Its expression, however, is conditioned by the other genes with which it is associated, for all the genes act together in one co-ordinated system. That means that a particular gene may be more effective in one genic environment than in another. Now the great advantage of sexual reproduction —which is universal in animals, and of general occurrence in plants—is that it enables new gene mutations to be tried out with various combinations of the other genes. If any particular combination gives, for example, increased resistance to any specific disease it will naturally increase at a faster rate than the less efficient combinations and eventually become dominant. Thus, gene mutations and their recombinations with other genes, are the chief methods employed by plants under natural conditions for the production of better adapted varieties.

It may perhaps be desirable to re-inforce the above argument which may not be well understood by those who lack a good knowledge of the fundamentals of the Mendelian principles of heredity, with some examples illustrating how the adaptation of plants to the conditions under which they are grown has operated in actual practice.

RED CLOVER.

Red Clover had its origin in Europe and was introduced into America at the beginning of the sixteenth century. In the course of time American red clover stocks became quite distinct from the European strains. The leaves of the former have developed an intense hairiness which is almost but not quite absent from the latter. The reason for the development of hairs in the American stocks was due to the persistent attacks of insect pests known as leaf-hoppers which are very prevalent in that continent. These pests do more damage to glabrous than to hairy plants. Hairy plants under American conditions possess therefore, a selective advantage over glabrous plants and, on the average, produce more seed. In these circumstances each succeeding generation would have a higher proportion of hairy plants than the preceding one. Furthermore, every mutation which had the effect of giving a dense population of hairs and/or longer hairs would naturally be seized upon and incorporated in the genetic constitution of the American strains.

In Europe, where 'leaf hoppers' of the American type are not a menace to the red clover crop, hairy plants have no selective advantage. In point of fact

glabrous plants are better adapted to the prevailing conditions and have now become dominant.

GRASSES AND CLOVERS.

A similar process of adaptation to the conditions imposed by the environ. ment is in operation in the grass and clover species which are comprised in the flora of our pastures and meadows. In well-grazed pastures, prostrate, leafy, multi-tillering and long-lived strains are developed. In some species, notably in perennial rye grass, some strains have become so well fitted to the environment that they are actually benefitted by the tramping of the grazing animals. On the other hand, where continuous meadowing is practised the strains of grasses and clovers which grow tall and have only a moderate tillering capacity are favoured and become dominant. Furthermore, these plants are not, as a rule, of perennial type. For this reason commercial grass and clover seeds are not well suited for laying down land to permanent pastures unless they have been derived by scientific breeding from old indigenous pasture strains.

SWEDES AND TURNIPS.

The commercial production of plant varieties resistant to a particular disease can be speeded up by the annual selection for propagation purposes of healthy plants which have been grown in areas where the disease is endemic. In many parts of this country, and in Great Britain, much damage is caused by a disease known as 'finger and toe' which attacks brassicas. Farmers in heavily infected areas in Scotland noticed that individual roots of swedes varied among themselves as regards degree of infection to this disease. They selected, year by year, as mother plants the healthiest available roots and by this continuous process obtained strains highly resistant to 'finger and toe.' Recently, these strains have been used by plant breeders for crossing with leading commercial swede varieties and new hybrids are now coming on the market combining disease resistance, high yield, good root quality and suitability for growing on a wide range of soils.

MODERN BREEDING METHODS.

The modern scientific methods employed in the production of disease resistant crop varieties are much more elaborate than those outlined above. They can best be illustrated by referring to the research and investigational work which has led to the production of rust resistant cereal varieties in North America.

Cereals throughout the world are attacked by hosts of parasites, but the most serious damage, from the economic point of view, is caused by a related

group of fungi which produces the diseases known as 'rusts.' Black stem rust (*Puccinia graminis*) reduces the yield of the world wheat crop to such an extent that the losses are estimated on the average to be as high as £100 millions per year, and in years of severe infestation susceptible varieties may be entirely destroyed over large areas. It is indeed fortunate that this disease is not, at present, a serious menace in our own country, owing to the fact that crop infection does not occur until the month of July, but if circumstances should arise which would cause an earlier attack, it would be a serious matter for Irish farmers as our best varieties are all extremely susceptible to attack.

The production of healthy wheat crops in America has been due to co-operative work in which plant breeders, plant pathologists, cytologists, agronomists and millers have combined. Briefly, the investigations have dealt with the life history of the pathogen, the search for resistant varieties within the wheat species itself, and in allied species and genera, the crossing of the most resistant types with high quality commercial wheat varieties, the testing of the new hybrid derivatives in nation-wide trials, and finally the evaluation of the milling and baking qualities of the most valuable new hybrids.

LIFE HISTORY OF BLACK STEM RUST.

It was found that black stem rust of wheat has two host plants—wheat and common barberry, and two types of spores—uredospores and teleutospores. The uredospores attack wheat and are capable of producing a new generation of spores once a week on the average. They are orange in colour. At the end of the wheat-growing season, as the grain begins to ripen, the uredospores give rise to resting spores, the black coloured teleutospores. These cannot attack wheat directly. The black teleutospores, which give the disease its name, pass the winter on the old straw and stubble. In the spring they germinate and infect the leaves of the barberry, causing orange coloured cup-like growths each of which produces thousands of spores. It has been estimated that an infected barberry bush of average size is capable of producing 64,000,000,000 uredospores. These are blown by the wind on to contiguous wheat plants and the new infection thus has its origin. It is possible, particularly in countries where the winters are mild, for the summer spore—the uredospore—to infect young volunteer plants in the autumn, if they are present, and pass the winter in that state. Therefore, the elimination of the barberry will not guarantee the complete elimination of the black stem rust disease.

In the United States a campaign for the eradication of the common barberry has been in operation since 1910 and at the end of fifteen years over 20,000,000 bushes had been destroyed. The result has been reduced rust losses. This is seen when the losses in the three five-year periods between 1915 and

1929 are compared. The estimated average annual loss for the first five-year period (1915-1919) was 50,109,000 bushels of wheat, that for the second period (1920-1924) was 25,777,000 bushels ; and that during the third period (1925-1929) was only 11,446,000 bushels.

Moreover, the barberry is the breeding ground for new parasitic strains of the rust. It is known that there are over 150 strains, or as they are called, 'biologic forms,' of rust capable of attacking wheat. Most, if not all, of these have been produced on the barberry where the pathogen develops its sexual stage and new virulent strains are being produced annually.

The breeding of wheat varieties capable of resisting all these strains is naturally very difficult, but it has been found that certain varieties of some of the twenty-eight chromosome species notably *T. Durum*, *T. dicoccum* and *T. timopheevi* have a natural resistance to whole groups of rust biologic strains. These have been crossed with varieties of bread wheat of outstanding quality, like Marquis, which have forty-two chromosomes in their cells, and although the difference in chromosome numbers creates certain breeding difficulties, new varieties have been secured combining yield, quality and high disease resistance. Two of the outstanding interspecific crosses have been Hope and Thatcher. Hope has been derived from a cross between Marquis and Emmer, and Thatcher is the result of a complicated series of crosses in which Marquis, Iumillo and Kanred were used.

Thatcher wheat was tested throughout the northern areas of the United States and proved to be significantly superior to Marquis in yielding capacity. Milling trials showed that as regards crude protein, flour yield, loaf volume, crumb texture, and colour it was on the whole slightly superior to Marquis. Under the circumstances its area under this variety has rapidly increased and it is now the most widely grown variety of spring wheat in North America. Recent reports, however, indicate that a new virulent biologic form of stem rust has been evolved which is capable of attacking Thatcher. If this be so, newer and more resistant wheat varieties will have to be bred. In this connection the newly discovered wheat species, *Triticum timopheevi*, which has 14 chromosome pairs in its cells and contains factors conferring near-immunity to all existing rust strains, is now being crossed with the leading varieties of bread wheat, but so far no outstanding hybrids from these crosses have been developed on a commercial scale.

The most important discovery made during the course of these investigations was that the black stem rust pathogen existed in a number of distinct forms or varieties each so distinct in its reactions that it was capable of being identified. Further research work on other diseases has shown that the existence of biologic parasitic forms is of general occurrence. The problem therefore of breeding for disease resistance is much more complicated than was thought at one time, and it is especially so in the case of those diseases which

have a sexual stage of development, for in this case the pathogen has exactly the same mechanism as the host plant for the production of new, improved, or as we would prefer to say, more virulent biologic types. It would seem, therefore, for many of our farm and garden crops, existence is a continuous warfare between the host and the parasite, and parallels in naval affairs the competition between the makers of offensive and defensive armaments.

Not only do these different biologic forms differ from one another in their relation to the host plant, but they also react differently to the various disinfectants and other agencies used by man to control them. Darlington in a recent article* states that cyanide fumigation was used to control scale insects in lemon groves, and codling moths in apple orchards, with powerful effects for a few years, but eventually new races of these parasites were evolved which no longer succumbed to the chemical attack. He also states that a compound was invented which killed a mould which damaged fabrics, but eventually a new biologic type of mould appeared which actually thrived on the compound which was meant to destroy it.

The literature dealing with medical and veterinary diseases will also show that the new drugs and disinfectants, sulphonamides, penicillin, etc., do not give 100 per cent. successful results. In these cases it is probable that biological disease forms differing in their reactions to these preparations are concerned, and that eventually the diseases which they now are used to control will produce their own resistant forms and we will be back where we were before their invention.

The production, on an intensive scale, of healthy farm and garden crops is thus beset with difficulties and it is now clear that certain lines of investigation must be followed if that objective is to be maintained. The most obvious is that the life histories of the various pathogens must be studied so that they may be attacked at their most vulnerable stage. In the case of black stem rust that stage occurs on the barberry, and it would be desirable as a precautionary measure to initiate a campaign for the eradication of this shrub in this country. Secondly, plant varieties having factors for disease resistance should be sought for not only in the cultivated species themselves, but also in allied species and even genera. When found their factors can be incorporated, by scientific breeding methods, in the germplasms of the commercial varieties of the future.

Some workers have suggested that it may be necessary to abandon pedigree cultures in the case of self-fertilizing plants, and to revert to the older system in which commercial varieties were composed of numerous strains, or sub-varieties, differing from each other botanically and physiologically. They point out that the pedigree method of propagation under which all the

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*Darlington:—Heredity versus Disease (*World Digest No* 83).

individuals of a crop have been derived from an original single plant selection ensures that all the plants are genetically identical—they are almost as much alike as individuals obtained by asexual propagation. In such eases it is true that a single biologic form of a disease organism may be capable of destroying or damaging all the plants comprising the crop, whereas in the case of mixed crops a single biologic strain would not be capable of doing comparable damage.

Apart altogether from the undoubted loss of uniformity in the produce so desirable under present-day conditions, and the probable decline in the yield per unit area, which the adoption of this suggestion would involve it is very unlikely that any improvement as regards the production of healthy crops would be effected. The greater the number of varieties of the host plant, the larger is the number of biologic forms of the pathogen, and the greater is the opportunity of producing new virulent parasitic types. It is probable that the restriction of, say wheat varieties, to a few varieties bred for high resistance would eliminate very rapidly the majority of existing biologic forms of black stem rust and the production of new virulent types would have to proceed from a much narrower basis than is the case at present. This may not work out in practice, but it is significant that in this country where there is at present only one widely cultivated variety of barley and one dominant variety of spring wheat (Atle) and only two varieties of winter wheat (Wilhelmina and Pajbjerg) there is little difficulty of maintaining healthy crops of these cereals.

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SOME OBSERVATIONS ON PLANT DISEASES IN IRELAND IN 1947

By

ROBERT MCKAY, D.Sc.

Professor of Plant Pathology, University College, Dublin.

Climatic Conditions. The year 1947 furnished what might be called "freak weather" throughout the greater part of Ireland. Following a very severe winter of frost and snow the spring was abnormally backward and late. A wet March left the ground so sodden that work on the land was rendered practically impossible in many places during that month. Some improvement in the weather took place in April but the month finished cold and wet, and tillage operations were very much in arrears. Consequently the sowing of all crops was delayed everywhere from three to four weeks beyond the normal time. The months of May and June were both wet, but the weather again improved somewhat in July. August was exceptionally warm and dry and climatic conditions during the harvest were good with the rainfall below normal for September and October. Much the same type of weather was experienced all over the country but with a greater precipitation elsewhere than that shown in the following data for Co. Dublin.

RAINFALL AT GLASNEVIN, CO. DUBLIN, FOR THE MONTHS MARCH TO OCTOBER, INCLUSIVE, 1947.

Month	*No. of days on which precipitation occurred*	*Total Rainfall Inches*
March	25	5.29
April	18	2.95
May	21	3.96
June	21	3.49
July	17	2.40
August	1	1.18
September	15	1.78
October	11	1.08
	129	22.13

CEREAL DISEASES.

The three years previous to 1947 were all characterized by relatively dry spring seasons. Thus, at Glasnevin, Co. Dublin, the total rainfall for the two months April and May in 1944, 1945 and 1946 was 2.61, 3.29 and 3.40 inches respectively, or in each year less than half that for the same period in 1947, *viz.*, 6.91 inches. In each of these dry springs, Powdery Mildew, *Erysiphe graminis*, and Yellow Rust. *Puccinia glumarum*, were virulent and severe on wheat, whereas in 1947 *Erysiphe graminis* was negligible, and although *Puccinia glumarum* occurred (it being endemic at Glasnevin) its attacks throughout the year were extremely slight. That this was not due to any lack of sources of disease being present in the case of this rust early in the season, was shown by investigations carried out by Mr. John F. Mullin, a post-graduate worker in the Plant Disease Division. In spite of the severe climatic conditions of the winter of 1946-47, *Puccinia glumarum* survived on volunteer plants, and although germination was occasionally low, at no time during the winter was it found impossible to collect viable uredospores. Some of these were found in the old rust sori on the 19th March just after the last snow had disappeared, and furthermore, fresh uredosori were developing in the neighbourhood of the old pustules on volunteer plants on 27th March. Yellow Rust, however, was not detected on an adjoining wheat crop until the 6th May, when a few plants were found infected. From then on the disease was present everywhere, but it never became virulent nor approached anything like the severity experienced in the previous three years. Evidently the inclement weather conditions mitigated the ravages of this rust in 1947. This is in agreement with records kept at Glasnevin since 1930, which show that attacks of Yellow Rust have always been comparatively mild in wet years. In Ireland Yellow Rust is common on the east coast and in districts with a low rainfall, but it is of rare occurrence or entirely unknown in the wetter areas.

Ear Blight due to the conidial stage of *Gibberella Zeæ* was prevalent on wheat ears in Co. Dublin when the grain was still in the soft dough stage towards the end of July. At this time the bleached diseased spikelets readily attracted attention, standing out prominently against the normal green of the host. Although it was rare to find more than a single spikelet on the ear attacked the incidence of infection was high, up to 10 per cent. of the heads being affected. The rapid onset of unusually warm weather in August stopped all further development of the disease. In some cases, however, the central rachis was already invaded and this prevented the development of grain above the point of attack, this factor contributing to the rather low yields of grain. Ear Blight was also identified on samples of wheat forwarded from the following counties: Galway, Kerry, Tipperary, Waterford and Offaly. Seeing that Co. Dublin has the lowest rainfall of any county in Ireland, it is possible that this disease may have been more widespread than indicated by the number of affected samples received. As already stated, the warm

weather in August stopped the development of the fungus entirely, and the effects of the disease afterwards were not nearly so obvious as in wet autumns, when the reddish growth of the parasite is present between the spikelets and the bluish black perithecia develop on the glumes. In 1947 it was only during the time the heads were green that infected spikelets could be seen, and at harvest time diseased heads could only be recognized, as a rule, when the grain was dissected out and incubated in a moist chamber. Since the epidemic of *Gibberella Zeæ* in Ireland in 1942, perithecia of the fungus were not uncommon in each of the intervening years, but these fructifications were not recorded in 1947.

Take-All, *Ophiobolus graminis*, was noted as severe on a crop of wheat following potatoes, 20 per cent. of the plants being attacked. Bad outbreaks of Black Stem Rust, *Puccinia graminis*, occurred in several counties during August and September, wheat in some areas being the crop attacked by the form *Tritici*, and in other districts the disease occurred as *Puccinia graminis Avenæ* on oats.

Owing to the cold, wet weather of May and June, apart from the lateness of sowing, cereal crops generally and oats and barley particularly, presented a pale, sickly, starved appearance, somewhat indicative of nitrogen deficiency. Partial recovery to the normal green colour took place in July, and with the advent of very warm weather early in August such crops ripened quickly, but with poorly-developed grain.

FLAX DISEASES.

Some 93 samples of flax were forwarded for examination by the Flax Inspectors and the following is a summary of the diseases present on these specimens :

Diseases	Samples Affected
Fungus Diseases:	
Grey Mould, *Botrytis cinerea*	21
Rust and Firing, *Melampsora Lini*	21
Foot Rot, *Phoma* sp.	16
Damping-off, *Rhizoctonia*	5
,, *Alternaria* sp.	1
,, unidentified fungi	4
Stem Break and Browning, *Polyspora Lini*	7
Wilt, *Fusarium Lini*	4
Seedling Blight, *Colletotrichum linicola*	1
Stalk Disease, *Sclerotinia sclerotiorum*	1
Insect Damage:	
Capsid. sp.	4
Flax Flea Beetle, *Longitarsus parvulus*	2
Damage by birds	1
Non-parasitic troubles	5
Total	93

A severe storm of wind and rain swept the south of the country early in May, checking the growth of flax considerably and in some cases causing complete failures. An inspection of crops in the southern flax-growing districts was made during the second week of July. At this time the bulk of the crop had just passed its flowering stage. In spite of the wet May and June, flax, although rather shorter than usual, was not seriously affected with fungus diseases.

Melampsora Lini. Rust was found in practically every field visited, but the incidence of infection was slight and the disease required searching for, sometimes only a few plants showing pustules of uredospores on their top foliage. Two crops, however, were badly affected with Firing, the crusts of teleutospores being situated near the base of the stems just above soil level. In these particular fields Rust also occurred on the tops of the plants in the form of uredospores, but the intervening parts of the plants were entirely free from the disease. It thus appeared as if there had been two separate outbreaks of Rust on these crops, one occurring during the early stages of the plant's growth and which had for some reason or other (probably climatic conditions) been arrested in its spread and development; the second outbreak occurring about the time of flowering. The uredospore stage was much more obvious on the tops of the plants in these two fields than anywhere else on other flax crops. The worst diseased crop of flax seen was in a field which had

been used for several years not only as a spread-ground for retted flax but also as a haggard for stacking the crop. Here, both Rust and Foot Rot *Phoma* sp. were exceptionally severe and the crop seriously impaired.

Other fungus diseases met with during the tour of inspection in order of their importance were, The Grey Mould *Botrytis cinerea*, Stem Break *Polyspora Lini*, *Rhizoctonia* and the Stalk Disease *Sclerotinia sclerotiorum*.

The greatest harm to flax in Co. Cork in 1947 was done by Leather Jacket grubs. Numerous fields had their stand of plants greatly reduced by this pest, and in a number of cases crops were so ravaged by it that they had to be ploughed up. Many fields were literally infested with these grubs as the openings on the surface of the soil indicated, and when the top couple of inches of soil was turned over several Leather Jackets could be found on every square foot of ground.

DISEASES OF ROOT CROPS.

Potatoes: *Phytophthora infestans*. Potato foliage affected with Blight first came to hand from Offaly on the 7th June, and other specimens were received on the 11th, 12th, 13th, 16th and 17th of the same month from counties Mayo, Wexford, Cork, Waterford and Dublin respectively. The disease was common on potatoes everywhere by the end of June, early and second early varieties being badly attacked. Not only were the tops of these varieties killed prematurely in many places, but a high percentage of diseased tubers occurred. Thorough spraying of the main crop kept the disease in check during July, and the very warm weather in August stopped all development of it for some time. Blight resumed its activities in September, fructifying rather freely on the foliage towards the end of the month, and quickly killing off the tops early in October. This rapid death of the tops and the very dry condition of the soil were not favourable to tuber infection at this time, and the percentage of blighted tubers in the main crop was negligible.

Sugar Beet and Mangels: Blackleg of beet and mangel seedlings was common in May and June and, as is usual, it accounted for a number of crop failures. In different countries various fungi have been reported as being involved in the production of Blackleg, but it is known that environmental factors determine to some extent the development of this disease. Under conditions in this country, amongst the fungi *Phoma betæ* has been found to be the predominant organism present, this fungus occurring in 93 per cent. of 114 samples of Blackleg investigated in sugar beet seedlings in 1947. As all sugar beet seed sown in Ireland is treated with a prescribed fungicide before distribution to the farmers, the present seed dressing appears to be one of very doubtful value in the control of *Phoma betæ*.

Downy Mildew, *Peronospora Schachtii*, was much less common than in the previous year. Nearly all the severe cases of this mildew seen occurred in the

vicinity of seed crops. Fortunately this practice of growing seed and root crops of beet and mangels adjacent to each other is now being discontinued. Virus Yellows, though present in most localities, was also much less prevalent than in 1946, patches of affected plants remaining small and comparatively little spread of the disease taking place. On shallow or light gravelly soils some wilting of the roots occurred during August owing to the drought, but generally speaking, this was not serious and the plants soon recovered after rain which occurred early in September.

Crops of mangels and swedes grown for seed production were more or less failures, the yield of the former being from 1-1½ cwt. per acre instead of 15-20 cwt. and that of swedes only slightly better. These failures were mainly the result of injury to the stecklings wintered outside *in situ*. The majority of the plants survived but they were so damaged by frost that although they managed to produce flowering shoots, these were thrown up at the expense of stored food material, and as practically no roots were present the supply of water and food materials was exhausted in a short time and the shoots soon succumbed. In addition to lack of proper roots, many of the steckling bulbs when cut were found to have dead areas present.

FRUIT AND VEGETABLE DISEASES.

Fruit crops of all kinds were poor, inclement weather at flowering time not being conducive to fertilization. Apple scab, *Venturia inæqualis*, was very bad in the wet autumn of 1946, and as a natural consequence infection of the bud scales was prevalent in the following dormant season. Perithecia of *Venturia inæqualis* were found on 25th March, 1947, on scabbed apples which had overwintered in the orchard at Glasnevin. This apparently is the first record of the occurrence of these fructifications on the fruit. An unprecedented development of perithecia also occurred on fallen leaves, so that there was no want of sources of the disease in the spring. Scab appeared early in May, soon became virulent and was exceptionally severe throughout the season.

Leaf spot, *Pseudopeziza Ribis*, was bad on both red currant and gooseberry bushes in counties Wexford and Kilkenny, causing defoliation of the bushes in July. Attacks of *Ascochyta Pisi* and *Mycosphaerella pinodes* on peas were common and destructive.

Tomato plants affected with Bacterial Canker, *Corynebacterium michiganense*, were received from a Co. Dublin tomato grower on 12th June, 1947, the plants being raised from imported seed. This is the first occurrence of this serious tomato disease in Ireland. Unfortunately it was not the only outbreak, as four others, widely separated, were identified during the season.

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KELP AS A REVERTING MATERIAL FOR SUPERPHOSPHATE

By

T. Walsh, Ph.D., M.Agr.Sc., D.Sc.

During recent years considerable attention has been devoted to methods designed to decrease the water solubility of superphosphate without impairing its fertiliser properties. Research has shown that when phosphate in water soluble form is added to a soil, depending on various characteristics of the latter, a reversion to a form unavailable to plants takes place to a greater or lesser degree. This reversion is intimately associated with the composition of the colloidal portion of the soil, its pH and degree of calcium saturation. It accounts for the fact that under certain soil conditions phosphatic fertilisers may have little residual value and for the established fact that in general the recovery of added phosphate from the soil in plants and drainage is, on the average, about 30 per cent. Experiments in Russia, Australia and New Zealand have shown that by decreasing the water soluble phosphate content of superphosphate, through the addition of such materials as serpentine, dolomite and limestone, a considerable conservation of phosphate is possible. In New Zealand, for example, it has been reckoned that the application of this reversion procedure has led to a 25 per cent. conservation of phosphate. The addition of these materials acts, of course, by conversion of the phosphate into water insoluble, though plant available, forms such as dicalcium phosphate, dicalcium dimagnesium phosphate and dimagnesium phosphate.

During recent years the admixture of superphosphate with kelp was necessary in the preparation of compound fertilisers, and as kelp is a highly alkaline basic material it was thought that its addition to superphosphate might result in considerable reversion. In order to explore the extent to which this reversion took place and to examine the value of the resulting product as a source of phosphate for plant growth, some experiments were undertaken. An account of this work is presented here.

LABORATORY EXPERIMENTS.

Varying proportions of kelp and superphosphate were mixed together. Two samples of superphosphate, differing considerably in phosphate content and origin, were used. The Moroccan sample was made from Moroccan

rock phosphate and contained 18.7 per cent. total, 18.6 per cent. citric soluble and 18.0 per cent. water soluble P_2O_5. The Clare phosphate was prepared from a hard phosphatic rock inter-stratified in carboniferous limestone in Co. Clare. It contained 13.5 per cent. total, 10.2 per cent. citric soluble and 9.6 per cent. water soluble P_2O_5. After remaining at ordinary laboratory temperature, the mixtures were analysed for water soluble, citric soluble and total P_2O_5 content after periods of two and eight months, the latter to test the effect of time on reversion. The results are presented in Table I. The sample of kelp used contained 1.4 per cent. total and .8 per cent. citric soluble P_2O_5, none being present in water soluble form. It contained 11.5 per cent. K_2O. The reversion percentage figures which are given here, and in other tables subsequently, were obtained from the calculated water soluble phosphate and that transferred to the citric soluble form (obtained by difference).

TABLE I.

Type of Super-phosphate	Super : Kelp	Total P_2O_5 per cent.	Citric soluble P_2O_5 per cent.		Water soluble P_2O_5 per cent.		Calculated water soluble P_2O_5 per cent.	Reversion per cent.	
			after 2 months	after 8 months	after 2 months	after 8 months		after 2 months	after 8 months
Moroccan	0 : 1	17.0	16.7	16.7	16.0	16.0	16.2	1.25	1.25
,,	2 : 1	12.8	12.5	12.7	8 6	5.6	11.8	27.1	52.7
,,	4 : 3	11.2	11.0	11.3	5.9	3.1	10 3	42.7	70.0
,,	1 : 1	9.9	9.5	9.8	4 1	1.1	9.0	54.4	87.8
Clare	9 : 1	12.5	9.5	10.0	8.2	6.5	8.7	5.7	25 3
,,	2 : 1	9.6	6.8	7.2	3.2	1.4	5.9	46 0	76.3
,,	4 : 3	8 5	6.1	6.7	1 8	1.1	5.5	67.3	80.0
,,	1 : 1	7.3	5.5	5.4	1.5	.8	4.8	68.8	83.3

From the data in Table I it can be seen that the addition of kelp to superphosphate resulted in a considerable decrease in the water soluble P_2O_5 content of the mixture. The reverting power of each unit of kelp was somewhat higher in the case of Moroccan phosphate than with the Clare phosphate. In the case of the latter, reversion increased at all levels of kelp after leaving for eight months, while in the case of the Moroccan sample this increase was very considerable at all except the lowest level of kelp. As might be expected, the reverting power of each unit of kelp decreased with an increase in the quantity of kelp in the mixture, the most effective level in this respect being the 2 : 1 super-kelp mixture, though of course by no means maximum reversion occurred at this level. The results obtained from these tests were verified later by further tests on mixtures made up in considerable quantity for field trial purposes. Reference to Table VIII shows that the optimum reversion mixture was about 2 : 1 super-kelp, though considerable reversion also took place at the 4 : 1 level. These latter results were obtained after a five months' storage period.

In further laboratory tests made in connection with some preliminary pot experiments, tests were made to compare the reverting power of kelp as compared with dolomite, serpentine, and calcium hydrate. As heat treatment is generally applied when preparing such materials as serpentine-superphosphate elsewhere, it was decided to include a heat treatment in this instance. The superphosphate sample used in these tests contained 18.2 per cent. total P_2O_5, 17.7 per cent. citric soluble and a like quantity of water soluble P_2O_5. Heat treatment was carried out by leaving the mixtures in a moist condition in a hot air oven at 70° C. for five hours.

TABLE II.

Mixtures	Treatment	Total P_2O_5 per cent.	Citric Sol. P_2O_5 per cent.	Water Sol. P_2O_5 per cent.	Reversion per cent.
Super-Kelp 8 : 1	—	16.5	16.5	16.4	0.5
3 : 1	—	13.1	12.7	9.3	26.7
2 : 1	—	11.8	11.4	5.9	48.2
3 : 2	—	10.7	10.6	5.1	52.0
1 : 1	—	9.0	8.9	3.1	65.2
Super-Serpentine 2 : 1	heated	12.8	11.2	2.1	82.2
Super-dolomite 2 : 1	heated	13.2	12.2	4.7	60.2
Super-Ca $(OH)_2$ 2 : 1	heated	12.4	11.5	0.3	97.5
Super-Kelp 2 : 1	heated	11.8	11.6	0.9	92.4
Super-Kelp 1 : 1	heated	9.6	9.5	0.7	92.7

From the above table, it can be seen that when heat treatment was adopted the kelp proved to be almost equal to calcium hydrate in reverting power and that it was considerably more efficient than either finely ground dolomite or serpentine. Heating also increased reversion from the water soluble to citric soluble form very considerably without effecting a transference from the citric soluble to the citric insoluble category. This table will be referred to again later. It is of interest to note that all the reverting materials used gave a high yield of citric soluble phosphate. This is of particular interest where the lime treatment is concerned, as a considerable reversion to basic phosphates of the hydroxy apatite type might have been expected.

The solubility of potash, calcium and magnesium in super-kelp mixtures.

In order to arrive at an explanation of the cause of the phosphate reversion in the manner noted it was decided to examine the effect of reversion on some other constituents of the materials used. For instance, when serpentine is used as a reverting agent for superphosphate the main effect is the formation of dimagnesium and some trimagnesium phosphate, while with dolomite the reversion is mainly to a mixed dicalcium dimagnesium phosphate. The main purpose of this test, therefore, was to see whether the quantities of calcium and magnesium present could account for the reversion noted, kelp containing appreciable quantities of both calcium and magnesium—four samples examined containing from 3.4 to 3.7 per cent. MgO. (See Table VII). Incidentally, from a number of tests carried out, the water soluble phosphate in kelp has been found to be negligible, while the citric soluble phosphate has been found to be as high as 1.5 per cent.

Kelp and superphosphate were mixed at the rates indicated in Table III. In addition to P_2O_5, K_2O, CaO and MgO estimations, pH determinations of aqueous suspensions of the mixtures were made, with a view to exploring the effect of acidity status on reversion. The results are given in Table III.

TABLE III.

Mixtures, etc.	Per cent. CaO			Per cent. MgO			Per cent. K_2O			Per cent. P_2O_5			pH
	Total	Citric Sol	Water Sol.	Total	Citric Sol.	Water Sol.	Total	Citric Sol.	Water Sol	Total	Citric Sol.	Water Sol.	
Kelp . . .	16.7	14 7	0	4.3	3 5	Trace	12.3	12 3	12 0	1 2	1.2	Trace	9.9
Superphosphate .	27.7	12.2	6 0	0.7	0 7	Trace	—	—	—	15.4	14.5	14.5	1.8
Superphosphate : Kelp													
8 . 1	26.7	13.5	5 5	1 1	1 0	0.9	1.6	1.4	1.4	14.1	14.0	12.5	3.0
4 · 1	25.6	13.8	3.4	1.35	1.2	0.95	2.4	2.3	2 2	13.0	12.8	8 6	4.4
2 : 1	24.2	14.3	2.1	1.5	1.5	0.9	4.1	4.1	4.0	11.2	10.9	4 0	4.75
4 : 3	23.4	15.0	1.7	2.1	2.0	0.95	5.4	5.2	5.2	9.3	9.3	2.4	5.0
1 : 1	22.5	15.8	1.7	2.2	2.1	0.95	6.4	6.0	6.0	8.7	8.4	1.5	5.6

The most noteworthy features of the analyses presented in the above table are the decrease in water soluble calcium with increasing quantities of kelp in the mixture, the parallel decrease in water soluble P_2O_5, the increase in water solubility of magnesium when superphosphate and kelp were mixed, and the failure of mixing to have any effect on the water soluble potash in the kelp. Calculation from the figures shows that there is more than sufficient calcium and magnesium present to account for reversion to dicalcium or a mixed dicalcium dimagnesium phosphate. The parallelism between the results for water soluble CaO and P_2O_5 would seem to indicate

clearly that dicalcium phosphate is the main product of the reversion. The increase in water soluble MgO following admixture of kelp with phosphate was probably due to the acidity of the resulting mixture, and it is significant in this respect that with a decrease in acidity at the higher levels of kelp, there was a relative decrease in water soluble MgO. The results leave no doubt that the availability of the K_2O in the kelp is not adversely affected in mixing with superphosphate and these results are substantiated by the plant growth results reported later. The reduction in water soluble phosphate in the mixtures followed decrease in acidity as measured by pH.

Effect of ammonium sulphate on phosphate reversion in superphosphate-kelp mixtures.

Some preliminary tests showed that the inclusion of a relatively large quantity of ammonium sulphate in kelp-superphosphate mixtures appreciably reduced reversion. In order to explore further this point, a series of mixtures was made up including varying proportions of superphosphate, kelp and ammonium sulphate in each. The results of water soluble P_2O_5 and pH determinations on this series are presented in Table IV. The analyses were made about six weeks after mixing.

TABLE IV.

Super-phosphate : Kelp : Ammonium Sulphate	Per cent. P_2O_5 Water Soluble	Per cent. Calculated Water Soluble P_2O_5	Per cent. Reversion	pH
1 : 1 : 0	2.55	7.68	66.8	5.48
8 : 8 · 1	1.02	7.12	85.7	6.16
4 : 4 : 1	0.95	6.83	86.1	6.19
2 : 2 : 1	0.95	6.35	85.0	6.28
1 : 1 : 1	1.53	5.12	70.1	5.54
4 : 2 : 1	5.23	8.78	67.9	4.90
2 : 1 : 1	5.35	7.68	30.4	4.90
2 : 1 : 2	4.97	6.15	19.2	4.90
Superphosphate	15.37	—	—	2.13
Kelp ·	Trace	—	—	9.82

These results show that while the admixture of a relatively high amount of ammonium sulphate considerably decreased reversion, the addition of a

smaller quantity on the other hand significantly increased it. Thus, the admixture of one part of ammonium sulphate with eight parts each of superphosphate and kelp increased reversion from 66.8 per cent. to 85.7 per cent., while even where equal parts of the three materials were used there was an appreciable increase. The reversion decreasing effect of ammonium sulphate when used in high quantity is obviously directly related to the amount of kelp in the mixture. A striking feature of the results in Table IV is the considerable decrease in acidity following the inclusion of relatively small quantities of ammonium sulphate in the mixtures where equal quantities of kelp and superphosphate were used. This decrease in acidity is closely related to increase in reversion, thus verifying a previous observation (Table III), but indicating further, however, that this reversion was independent of the level of calcium present.

That it was not the sole cause of reversion, however, is supported by the results from the 2 : 1 : 1 and 2 : 1 : 2 levels of superphosphate : kelp : ammonium sulphate where there is a considerable difference in reversion at the same pH level.

On comparing the above results with those in Table II it would appear that treatment of the kelp phosphate mixture with a relatively small quantity of ammonium sulphate was practically as effective in increasing reversion as relatively rigorous heat treatment. While sufficient work has not been carried out to explain the decrease in acidity at the low ammonium sulphate levels, it is probably associated with an initial release and subsequent re-absorption of ammonia, the effect of the acid radicle only becoming obvious at the higher levels of ammonium sulphate used, sufficient calcium being present at the higher levels of kelp and superphosphate to counteract effectively the sulphate liberated by the formation of calcium sulphate. It may be added that there was no evidence of loss of nitrogen from any of the mixtures used.

POT AND FIELD TESTS WITH KELP—SUPERPHOSPHATE MIXTURES.

While the laboratory tests afforded considerable information on the availability of the phosphate in the kelp-superphosphate mixtures, it was decided, in order to test their efficiency as sources of phosphate for plants, to carry out pot and field experiments. The pot experiments were mainly of an exploratory nature, while the field experiments were of a comprehensive nature and were carried out at the Department's schools at Athenry, Ballyhaise and Clonakilty, and at Johnstown Castle Agricultural College during the 1946 season. In this report, these centres are referred to as Centres No. 1, No. 2, No. 3 and No. 4, respectively. In the field experiments, the efficiency of the kelp-reverted phosphate as a source of potash was also investigated.

Pot Experiments : In these tests, mustard was grown as an indicator crop in a medium consisting of equal parts by volume of pure quartz sand and soil. The soil used was a Silurian-derived medium loam which showed a low value for available phosphate, contained .20 per cent. exchangeable calcium, had a base exchange capacity of 21 m.e./100 grm. and a pH of 5.5. In each instance, a basic treatment of nitrogen and potash was applied at a rate similar to that used in Mitscherlich's well known nutrient test method, due allowance being made for the potash added in the various kelp-phosphate mixtures. The latter were added in powder form and thoroughly mixed with the soil-sand medium. Phosphate was added on the basis of total P_2O_5 in the mixtures, *i.e.*, the level of total P_2O_5 added was the same for each treatment. The tests with the kelp-phosphate mixtures were carried out in glazed earthenware jars with suitable provision for collecting drainage. A second set (Series I) of experiments was carried out simultaneously to investigate the value of a kelp-phosphate mixture in both the heated and unheated condition (see Table II) as compared with mixtures of superphosphate with serpentine, dolomite, and calcium hydrate, similarly treated, using, however, unglazed earthenware pots of half the capacity of the jars used in the other experiment. All treatments were duplicated. In both instances the experiment was extended to ascertain the residual effects of the various treatments, a second crop of mustard being grown for this purpose. The first crop was sown on 11th September and harvested 15th December, while the second crop was sown early in January and harvested early in June. The results, giving average yields in grms. per pot, are presented in Table V (Series I) and Table VI (Series II).

TABLE V.

Treatments	Yield (grms. per pot)	
	1st Crop	2nd Crop
No. 1 Superphosphate and Kelp (added separately)	51.2	25.7
No. 2 ,, 8 parts ; Kelp 1 part	62.5	25.1
No. 3 ,, 3 ,, ,, 1 ,, ...	58.8	22.9
No. 4 ,, 8 ,, ,, 2 ,, ...	45.7	20.8
No. 5 ,, 1 ,, ,, 1 ,, ...	49.9	27.3
No. 6 ,, 0 ,, ,, 0 ,, (Control) ..	5.6	3.6

Observations made throughout the growing season showed that, for the first crop, treatment No. 2 appeared to be consistently the best, and this is

borne out in the yield results. Where no phosphate was applied, phosphate deficiency symptoms were severe from an early date. An idea of crop response may be obtained from Plate 1.

TABLE VI.

Treatments	Yield (grms. per pot)	
	1st Crop	2nd Crop
No. 1 Super-Kelp 1 : 1	20.3	15.2
No. 2 ,, ,, Heated	19.6	11.8
No. 3 Super-Serpentine 2 : 1	13.4	11.7
No. 4 ,, ,, ,, Heated	16.9	16.8
No. 5 Super-Dolomite 2 : 1	15.3	15.6
No. 6 ,, ,, ,, Heated	15.5	16.3
No. 7 Super-$Ca(OH)_2$ 2 : 1	15.3	14.4
No. 8 ,, ,, ,, Heated	19.6	16.1
No. 9 No phosphate	3.9	5.2

These yields confirm observations on crop growth in that the kelp-phosphate and the heated lime treatments were best in the first cropping season. When the yield results are compared with the analytical results previously presented in Table II, it is obvious that crop response was not related to the degree of reversion as judged from the water soluble and citric soluble P_2O_5 figures and that, in fact, the highly reverted materials used in treatments No. 2 and No. 8 were efficient sources of phosphate.

Field Experiments: At the four centres, named previously, selected for field experiments, a number of superphosphate-kelp mixtures were made in considerable bulk, thorough mixing being carried out. Mixing took place approximately five months prior to application. Immediately before use, representative samples were taken from each mixture. In addition, the samples of superphosphate and kelp from which the mixtures were made were analysed. The results of the latter analyses are presented in Table VII, while those of the various mixtures are presented separately in Table VIII.

Plate 1

Pot	5 :	first	crop of	mustard	with treatment	No. 1.	Table 5.
..	17 :	..	..	..	..	No. 2.	..
..	18 :	..	..	..	..	No. 3.	..
..	27 :		..	..	..	No. 4.	..
..	25 :	..	..	..	..	No. 5.	..
..	60 :	..	..	..	..	No. 6.	..

TABLE VII.

Centre No.	Superphosphate P_2O_5 per cent. Total	Superphosphate P_2O_5 per cent. Citric Sol.	Superphosphate P_2O_5 per cent. Water Sol.	Kelp P_2O_5 per cent. Total	Kelp P_2O_5 per cent. Citric Sol.	Kelp P_2O_5 per cent. Water Sol.	Kelp K_2O per cent.	Kelp MgO per cent.	Muriate of Potash K_2O per cent.
1. Athenry ..	16.0	15.9	15.5	1.3	1.1	0	14.1	3.6	51.0
2. Ballyhaise .	16.0	15.8	15.3	1.1	1.0	Trace	14.0	3.4	49.7
3 Clonakilty .	16.4	16 3	15 8	1.3	1.2	0	13.4	3.7	48 2
4. Johnstown Castle	15.8	15 8	15.7	1.4	1.2	Trace	13.7	3.5	51.4

TABLE VIII.

Mixture	Total P_2O_5 per cent				Citric Sol P_2O_5 per cent				Water Sol P_2O_5 per cent.				Per cent. Reversion			
	Centre (C) No															
Super Kelp	C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4	C1	C2	C3	C4
8 1	13.8	14.4	14.5	15.0	13.7	14.2	14 4	14 8	10.0	13.0	13 1	13.0	27.5	4.4	6.4	7.1
4.1	13.1	13.1	13.2	13.5	13 0	12.7	13.1	13.6	8 6	8.4	8.6	8.4	32.5	31.8	31.8	32.9
2·1	11 3	11 2	11 2	12 5	10.9	11.2	11.3	11.7	3.6	4.1	3.7	3.1	65.0	60.0	64.8	78.9
4·3	9 9	9 8	10 0	9.7	9.9	9.5	9.5	9 9	.9	1 5	1.5	1.0	90.0	83.0	83.3	90.0
1:1	8.8	8 8	8.8	9.0	8.5	8 4	8.5	8.8	.6	.8	.7	.6	90.9	89.5	91.1	94.1

Physical Condition of Mixtures at Time of Application : Some slight caking occurred where the higher rates of kelp admixture were used, but the lumps so formed disintegrated easily and presented no hindrance to the even distribution of the manures.

Treatments, experimental layout, etc. : The various treatments are listed in Table IX.

TABLE IX.

Treatment No.	Superphosphate applied (lb. per acre)	Kelp (lb.–ac. mixed) with Superphosphate	Kelp (lb. –ac.) added separately at sowing time
1	448	0	448
2	,,	56	392
3	,,	112	336
4	,,	224	224
5	,,	336	112
6	,,	448	Nil
7	,,	Nil	Nil*
8	Nil	Nil	448

*Potassium chloride applied at sowing time at a rate supplying same amount of K_2O as 448 lb. Kelp.

The system adopted was such that each plot (except, of course, the control) received equal additions of phosphates and kelp. That portion of the kelp which was not applied as portion of the superphosphate-kelp mixture, was added separately at sowing time to supply the total quantity listed. As a matter of interest it was decided to include a comparison of the relative merits of kelp and muriate of potash as a source of potash and to investigate, under the particular soil conditions obtaining, the value of the sodium, magnesium, etc., in the kelp, and for this purpose treatment No. 7 was included. The whole experimental area received a dressing of sulphate of ammonia at the rate of 2 cwts. per statute acre. Each treatment was replicated eight times at each centre, the plots being arranged as a randomised block. Each plot was 1/40 acre in area, the minimum width of each plot being ten drills. In each case the swede crop sown followed a cereal crop. All cultural operations were carried out in a uniform manner, the manures being distributed just prior to sowing. In selecting experimental sites the most uniform areas available were utilised. Composite soil samples were taken and examined for nutrient status, pH etc., the results of the examination being presented in Table X. The soil at Centre 1 was a well drained friable medium loam derived from limestone. It is representative of a considerable area of rather shallow limestone soil in western districts. Inherently its main tendency is towards potash deficiency with boron deficiency also a problem where boron sensitive crops are concerned. At Centre 2 the soil was a medium loam derived from Silurian drift and typical of a considerable area showing drumlin topography in northern counties. At Centre 3 the soil was a moderately deep friable

brown medium loam, usually showing good response to phosphate application. Centre 4 soil was a slightly compact fine sandy loam with slight to moderate gleying in the subsoil and in general, by reason of variation in the extent of gleying, less uniform than the soil at the other centres.

TABLE X.

	Centre 1	Centre 2	Centre 3	Centre 4
Phosphate ..	Medium-Medium High	Low-Medium	Low	Very Low
Potash ..	Low	Low-Very Low	Very Low-Low	Medium
Calcium ..	Extra High	Medium	High	Medium High
Magnesia ..	High	Medium	Medium High	Medium
Manganese ..	Trace	Low-Medium	Trace	Very Low
pH	7.3	5.5	6.5	5.5

Observations on crop response : With the exception that in every instance the plants in treatment No. 8 plots (no phosphate) showed very evident symptoms of phosphate deficiency from a very early stage, no other outstanding inter-treatment differences were noted. At Centre No. 1 symptoms of what seemed to be slight potash deficiency were noted at a relatively early stage and appeared to appreciably affect subsequent growth in general. At Centre No. 2 a chlorosis of the leaves followed later by a necrosis appeared on the plants in one particular area—not confined to any particular treatment, and the foliage of these plants was later shown to contain a much higher manganese content than comparable healthy leaves. The condition was in fact very similar to that usually attributed to manganese toxicity in swedes, which from this aspect appear to be a rather sensitive crop. Examination of the results presented in Table X shows in fact a relatively high concentration of readily soluble manganese to be present in this soil. At all the Centres dry rot appeared to a considerable extent but in no instance was it associated with any particular treatment. At all Centres also flea beetle attack occurred to a slight extent while at Centre 3 Finger-and-toe developed to an appreciable degree.

Harvesting: An area of two square perches from the centre of each plot was harvested, cleaned and weighed. Details of yields, etc., are presented in Table XI.

TABLE XI.

Mean Yield of Roots (tons per Statute Acre)

Centre No.	Treatments								Standard Error	Significant Difference P - 0.01
	1	2	3	4	5	6	7	8		
1	11.05	11 35	11.05	11.50	11.55	11.50	13.00	9.80	0.37	1 81
2	29.60	28.58	29.66	29.76	27.88	29.16	28.53	19.68	0.77	3.79
3	12.29	11 38	12.45	12.56	16.36	15.24	14 61	2.34	1.01	5.00
4	23.69	24.34	23.56	24.31	24 00	24 09	22 59	6.97	0.48	2.36
Mean (all Centres) ...	19.15	19.66	19.18	19.53	19.94	20.00	19.68	9.71	0.35	1.36

In general it can be seen that there was no significant difference between the various treatments used with the exception of the no phosphate plots. This means, of course, that the reverted phosphate was as efficient as that in water soluble form. From the data available on the initial nutrient status of the soil from the experimental sites it is apparent that the reverted material is an efficient source of phosphate even where the initial phosphate status of the soil is reasonably high, at different levels of calcium concentration and on soils representative of a considerable area of the country where soil group characteristics are concerned. At Centre No. 1 the yield from treatment 7 was significantly higher than that from treatments 1 and 3. The explanation for this may possibly have been due to a greater use-efficiency of muriate of potash under the existing soil conditions than of kelp as a source of potash, the calcium and magnesium content of the latter tending to accentuate the tendency towards potash deficiency noted, in a soil already calcium saturated. Where maximum reversion occurred in treatment 6 there was no significant difference in yield between it and treatment 7 and it is apparent from this that there was no interference with the solubility of the potash in the kelp used, thus verifying the analytical results in Table III, soil conditions with regard to potash being such that any difference occurring would have been evident. It may be noted that the soil conditions with regard to phosphate afforded a relatively wide range for this experiment as shown both in crop response and soil analysis. Table XII, where increased crop return per 4 cwts. of superphosphate applied is compared with the initial nutrient status of the soil further illustrates this.

TABLE XII.

Centre No.	Increase in Yield (tons per acre) from 4 cwt. Superphosphate per acre	Phosphate Status of Soil
1	3.2	Medium High
2	8.8	Low-Medium
3	12.3	Low
4	15.6	Very Low

In further field experiments carried out during the current season (1947) where kelp reverted superphosphate was compared with both superphosphate and basic slag this material has been shown to be if anything slightly superior to the other fertilisers tested, especially after being in intimate contact with the soil for some six months prior to the planting of the crop.

GENERAL DISCUSSION.

The experiments carried out show clearly that while the addition of kelp to superphosphate results in reversion of the phosphate of the latter from water soluble to citric soluble form, it does not lead to any loss in manurial value. The material produced is, in addition to being a highly valuable source of phosphate, also an efficient source of potash, while under certain soil conditions its secondary and minor element content should also be of considerable value. The residual value of this material, as, indeed, the more general problem of the value of different types of phosphate fertilisers in relation to conversion to unavailable form under soil conditions conducive to phosphate fixation, remains to be investigated. Experiments in this connection are, however, now being undertaken. There is every reason to hope that the kelp phosphate fertiliser described will prove worthy of consideration as a means of conserving phosphates at least under some soil conditions favourable to phosphate fixation.

While initially the investigation of the factors responsible for the reversion noted was regarded as being somewhat outside the scope of this study, some information in this connection has been obtained. Reversion from the water soluble to citric soluble form increased with time, while heat very much accelerated the reaction. Reversion was also considerably increased by including a relatively small amount of ammonium sulphate, reversion in this case being closely associated with a decrease in pH. Reversion was decreased where a larger quantity of ammonium sulphate was used. This effect of ammonium sulphate affords a very obvious practical means of regulating reversion in mixtures of superphosphate and kelp, and would be well worth consideration if the manufacture of a reverted phosphate from these materials

were contemplated. While considerable transference from the water soluble to citric soluble form occurred, there was no evidence of transference to more insoluble forms. Where two different types of phosphates were used reversion was considerably higher at the lower kelp levels in the case of Clare phosphate than where Moroccan phosphate was used, though at the higher kelp additions, a reversal of this position was evident.

The main constituent of the kelp responsible for reversion was calcium, a transference to dicalcium phosphate being the main reaction involved. The magnesium present in the kelp probably also plays a part in reversion, the final result being a mixture of dicalcium dimagnesium phosphate, although the amount of magnesium present would indicate its contribution to the reversion as being of a relatively minor nature. Reversion was also associated with the acidity of the mixtures increasing with a decrease in pH, and some evidence is available to show that this effect is independent of calcium concentration.

SUMMARY.

The admixture of superphosphate and kelp results in reversion of phosphate from water soluble to citric soluble form, a similar reaction being noted for calcium. Potash was unaffected, while at the lower levels of kelp a considerable increase in water soluble magnesium followed. The main reaction is a transfer to dicalcium phosphate, while the formation of dimagnesium phosphate or a mixture of both is also probable. Reversion increases with time of contact, on heating, following the incorporation of a relatively small amount of ammonium sulphate and with a decrease in pH. On the other hand, it decreased where the quantity of ammonium sulphate added, as compared with the amount of kelp in the mixture, is relatively large.

The reverted product compared very favourably with superphosphate as a source of phosphate for plants, and also with serpentine, dolomite and lime reverted phosphates, experiments to test its efficiency being carried out under a considerable variety of soil conditions. It is also an efficient source of potash and supplies a number of secondary and minor elements. It is considered that it may prove of particular value on soils where phosphate fixation is a problem. Experiments to investigate this aspect of its use are being proceeded with.

ACKNOWLEDGMENT.

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TRIALS ON DIRECT RESEEDING OF PASTURE

From 1940 to 1943, trials in direct reseeding of pasture with a view to its improvement were conducted at the Department's farms and a report on them was published in this Journal, Volume XLII, No. 1. The results then obtained did not commend the practice.

In 1944 the Instructors in Agriculture in twenty-two counties arranged for the direct reseeding of pasture plots on 39 farms. Except at a few centres, the land used had been in pasture for many years, was of low to medium fertility and bore inferior herbage containing an unduly high proportion of weeds. Tests showed that the soils were generally poor in available nutrients, especially phosphate. The area to be reseeded was ploughed in spring, given a dressing of 3 cwts. superphosphate per acre, limed where necessary, and sown with a seeds mixture composed of:—

18	lb.	Perennial Ryegrass
8	„	Italian Ryegrass
6	„	Cocksfoot
3	„	Timothy
3	„	Late Flowering Red Clover
1	„	Wild White Clover

The seeds used were of the commercial type, except at a small number of centres where seed of indigenous cocksfoot was procurable. The pasture produced by reseeding was at each centre compared with an adjacent plot of old pasture which was similarly limed and manured and, in addition, surface-cultivated.

Facilities for comparing the productivity of the plots in terms of live weight increase and/or milk yields, together with maintenance of stock, were available at only a small number of centres, but the relative amounts of grazing provided over the grazing season were recorded as cattle grazing days. For this purpose other stock, where used, were on a uniform scale, expressed as their equivalent of 2½-year-old cattle which were taken as the standard. The returns for the three seasons as cattle grazing days, together with some records of live weight increase and milk yield, are shown in the table appended to this report.

Comparison of the reseeded and old pasture areas was unsatisfactory from the outset on three farms and these are not included in this report.

OBSERVATIONS ON PROGRESS OF THE PLOTS.

FIRST (1944) SEASON (36 CENTRES).

At all but two centres the seeds were sown in April or May. There followed over the greater part of the country a prolonged period of dry weather, which

interfered appreciably with the development of the sward at 16 centres. At five of these, germination was satisfactory but subsequent growth poor, while at the remaining eleven, germination was delayed or irregular and establishment was patchy and growth slow. With the advent of adequate rainfall from mid-June to mid-July, growth on the plots was rapid. There was excessive growth of weeds, mostly annuals, at 17 centres, at 11 of which early growth of the new sward had not been satisfactory. It was found necessary to cut or otherwise destroy the weeds at eight centres. This treatment, combined with rapid growth of the grass sward from July onward, resulted in the suppression of weeds at all but a couple of centres. In West Waterford germination and establishment of the sown species were satisfactory on only about a quarter of the plot round the fences. The rest was occupied by weeds, and the trial was discontinued at this centre after the first season. In North Wexford germination and establishment were delayed and irregular and subsequent growth so poor that the amount of grass provided by the reseeded plot was negligible in the first season.

Despite the fact that the season was not generally favourable to their development in the early stages, good swards developed on the reseeded plots at all but a few centres where weather conditions and/or weed growth militated against them.

An appreciable improvement during the season in the quality of the herbage on the old pasture was reported from about half the centres. It generally took the form of a diminution in weeds and moss and increased growth of grasses and wild white clover, resulting in fresher, sweeter pasture. The extent of this improvement was very marked at seven centres.

The interval between seeding and first grazing of the reseeded plots varied from about 8 to 15 weeks. The plots were grazed and rested as the growth of the herbage required throughout the season. Excessive scouring of the stock occurred when they were first put on the reseeded plot at eight centres and, although at six of these the condition persisted for only a short time, at two it continued throughout the whole of the periods during which the stock were on the reseeded plot, or recurred in severe form at the start of each grazing period. There was an apparent difference in thriftiness or appearance of the stock in favour of the new swards at ten centres and of the old pasture at six. There was no obvious difference at the remaining centres.

The old pasture provided more grazing per acre at 27 centres, the reseeded plot at five centres and they were alike at three centres. At six of the eight centres at which records of live weight increase or milk yields were kept, the trend in these records conformed with that of the records of cattle grazing days.

At the end of the grazing season the reseeded plots presented a promising appearance, being, with a few exceptions, well covered and evenly grazed.

Although, as already mentioned, the old pasture plots had improved noticeably during the season at about half the centres, the reseeded swards were generally fresher and cleaner.

SECOND (1945) SEASON (33 CENTRES).

The reseeded swards made rapid growth and were fit to graze from one to six weeks earlier than the old pasture at 26 of the 33 centres observed. They were luscious and of satisfactory density at about 20 centres, but rather thin and patchy at the remainder. The herbage consisted very largely of perennial ryegrass, and clovers were generally scarce. These plots provided good grazing in spring, but in general they made poor recovery after the spring's growth was grazed off, tending instead to become thin, stemmy, dry and poor in the sole. Moreover, as the season progressed, it was evident at about half the centres that there was definite decline in the vigour of the ryegrass, that the cocksfoot, timothy and clovers were contributing relatively little to the swards and that weeds and inferior grasses were entering. At the other half of the centres the new swards remained reasonably dense and vigorous and presented a fresh appearance at the end of the season, but at only a small number of centres was the development of wild white clover satisfactory.

The stock did well on the first flush of growth on the reseeded plots. There was severe scouring at four centres, two of these being centres where it occurred severely in the previous season. At one centre (mid-Cork) scouring of the cattle was accompanied by intense dislike of the sward. Old herbage round the fences, and as far on to the old pasture plot as could be reached through the wire fence, was grazed in preference at this centre.

The old pasture plots, although slow in growth in the spring, provided better grazing during the summer months.

The reseeded plots provided the more cattle grazing days per acre at 18 centres, the old pasture at 12 centres and the number was the same at 3 centres. The records of live weight increase and milk yields at 12 of the 13 centres from which they are available confirmed the records of the cattle grazing days as an indication of the respective merits of the old and reseeded plots at each centre.

THIRD (1946) SEASON (30 CENTRES).

The growth and density of the reseeded plots were satisfactory at only 9 or 10 centres in the third season. The swards were mostly thin and weedy, and decline of the sown species was the most notable feature generally. The weather was unfavourable to spring growth. Clovers contributed little to the swards, except at a few centres. The old pasture plots carried denser herbage of indigenous species and provided what appeared to be firmer but later grazing.

In most cases there was no obvious difference in the progress of the stock on the plots. At one centre (Co. Cavan) the cattle scoured during most of the time

on the reseeded plot and made little progress. At four centres, the stock did better on the reseeded plot early in the season, but made equal progress on both plots afterwards. At one centre they did poorly on the reseeded plot in mid-summer, but did well throughout the season on the old pasture. Of nine further reports which indicated a difference in the progress of the stock on the two plots, five were favourable to the reseeded plot and four to the old pasture.

This season again the reseeded plots generally showed poor capacity for re-growth after the spring's grazing. They tended to become thin and dry during the summer, and weeds and inferior grasses were encroaching rapidly. By the end of the grazing season these plots appeared satisfactory at only 4 centres; at the remainder they had largely reverted or were rapidly reverting into poor, hungry-looking pastures.

Favourable reports on the condition of the old pastures at the end of the season were received from about 20 centres. These plots carried poor herbage at the remaining 10 centres.

The number of cattle grazing days provided this season was greater on the reseeded plots at about 14 centres and on the old pastures at 15 centres. At the remaining centre they were about the same. The returns of live weight increase and milk yield corresponded with those of cattle grazing days at 8 of 11 centres, while at one of the remaining three there was no appreciable difference between the plots either in terms of cattle grazing days or milk yields.

SUMMARY.

Trials arranged at 36 centres are examined. At one of these the reseeding was not successful and the trial was discontinued after the first season. At a second the amount of grazing provided by the reseeded plot in the first season was negligible. Records of productivity in terms of cattle grazing days are available from 35 centres in the first season, 33 in the second, and 30 in the third. Records of live weight increase and/or milk yield of stock were also kept at a number of centres in each of the three seasons, but complete returns for the three seasons are available from only a few centres.

Both the old pasture and reseeded plots were dressed with 3 cwt. superphosphate per acre at all centres, were limed at nearly all centres, and the reseeded plots were sown with permanent type mixture of commercial seeds. The first season was unfavourable to germination owing to abnormally dry weather, and establishment of the swards was interfered with at about 20 centres; towards autumn, however, nearly all the new swards had filled in and appeared promising.

The outstanding advantage which the reseeded plots had over the old pasture in the second season was early luscious growth, dominated by perennial ryegrass. After the spring's growth was grazed off, however, the reseeded swards made poor recovery, herbage tending to become thin, dry and stemmy, and they were generally disappointing during the summer. Although the reseeded plots looked somewhat better in autumn, there was evidence at many of the centres of decline of the sown species and encroachment of inferior grasses and weeds.

The spring of the third season of the trials was less favourable to growth of grass than usual and the reseeded plots, although noticeably more forward than the old pasture, were not generally fit for grazing as early as in the second season. The growth of grass on them was less vigorous and the most evident feature of the trials this season was the deterioration of the reseeded swards. By the end of the season they were poor and thin and in many cases were worse than the old pasture plots.

There was very noticeable improvement in the old pastures at about two-thirds of the centres, as a result of the treatment given. Growth on these plots in spring was appreciably slower than on the reseeded plots, but was better maintained during the summer months and, apart from the improvement observed, the quality of the swards, although mediocre at most centres, remained more stable over the three seasons.

Except in a couple of cases where depravity accompanied severe scouring, the new swards, except when they became dry during the summer, were relished by the stock and had generally a stimulating effect on thriftiness and milk yields. Scouring of the cattle when put on to the reseeded plots was a difficulty at a small number of centres in the first and second seasons.

As may be seen from the table, the tendency was for the reseeded plots to provide less grazing than the old pasture in the first season, somewhat more in the second, and little difference in the third. Taking the three seasons together, the productivity of the land was not increased by reseeding as compared with manuring and surface cultivation of the existing pasture. In fact, reseeding left a very poor pasture at most of the centres by the end of the third season.

No fertilizers were available for application to the plots after the first season (when 3 cwt. superphosphate per st. acre was applied) and it was generally evident, as the trials progressed, that the fertility of the plots was not sufficient to maintain a good sward of the sown species. The main advantage of reseeding was the earlier spring grazing provided. Apart from this, there was little or no return, except at a small number of centres, for the expense of cultivation and seeding.

Trials on Re-Seeding of Pasture, 1944-46—Returns Per Statute Acre

	Number of days between seeding and first grazing of re-seeded plot	1st Season						2nd Season						3rd Season						Totals for Trial Period	
		No. of Grazing Days		Live Weight Increase		Milk Produced		No. of Grazing Days		Live Weight Increase		Milk Produced		No. of Grazing Days		Live Weight Increase		Milk Produced		No. of Cattle Grazing Days	
		Re-seeded Plot	Old Pasture	Re-seeded Plot	Old Pasture	Re-seeded Plot	Old Pasture	Re-seeded Plot	Old Pasture	Re-seeded Plot	Old Pasture	Re-seeded Plot	Old Pasture	Re-seeded Plot	Old Pasture	Re-seeded Plot	Old Pasture	Re-seeded Plot	Old Pasture	Re-seeded Plot	Old Pasture
				lb.	lb.	gallons	gallons			lb.	lb.	gallons	gallons			lb.	lb.	gallons	gallons		
Cavan	102	123	168					172	186					183	214					478	568
Clare E.	74	138	206					207	200					132	115					477	521
Clare W.	64	74	89					121	121					119	114					314	324
Cork Mid. ...	97	59	169					160	144					158	184					377	497
Cork N.E. ..	74	48	92					87	123	208	271			81	92	172	151			216	307
Cork N.W. ...	58	72	57	188	157			170	67					250	140					492	264
Cork S.E. ...	105	31	124					145	85					115	135					291	344
Donegal	78	54	88					216	142	421	170			174	199	344	512			444	429
Dublin N. ...	70	34	159					204	160					130	156					368	475
Dublin S. ...	74	98	113			175½	197½	121	131			145	247	186	147			222	196	405	391
Galway N.W. ...	71	135	134					357	359					—	—					492	493
Galway S.E. ...	79	104	121					167	153					—	—					271	274
Galway N.E. ...	65	85	124					216	227					137	126					438	447
Kildare N. ...	55	70	151	Decr'se of 45	232			149	169	272	319			65	125	261	356			284	445
Kildare S. ...	57	108	125					145	182					409	240					662	547
Laoighis	59	151	119					183	145					148	135					482	399
Limerick N.E. ...	56	82	97					147	133			347	335	127	109			274	240	356	339
Limerick S.E. ...	76	64	141					206	174					235	278					505	593
Longford	64	78	110	48	329			113	176	287	439			87	152	173	471			278	438
Louth	69	81	100					108	125			170	108	96	108			231	237	285	333
Meath S.	59	44	94	227	90	—	145	92	130	455	588			—	—					136	224
Meath N.	106	101	101	140	56			364	364					—	—					465	465
Monaghan ...	94	45	114					210	242					168	128					423	484
Offaly	63	131	206					276	300	446	485	75	127	210	180	480	569			617	686
Roscommon ...	79	124	197					163	220					112	135					399	552
Sligo	66	101	111	271	322			159	149	318	295			185	156	329	295			445	416
Tipperary N. ...	106	120	134					187	137			331	249	91	143					398	414
Tipperary S. (1)	73	122	91			227	136	—	—					105	112					227	203
Tipperary S. (2)	72	136	106					240	156					93	63					469	325
Waterford W. ...	92	63	75					—	—					—	—						
Waterford E. ...	88	78	104					—	—					—	—						
Westmeath ...	64	115	135					152	113					117	126					384	374
Wexford S. ...	87	113	90					249	184	577	421			154	125	292	185			516	399
Wexford N. ...	—	—	*					348	268			772	635	283	284			605	587	631	552
Wicklow E. ...	93	117	139					141	120					131	123					389	382
Wicklow W. ...	82	106	105					239	185					100	133					445	423
Means		92	122 (35 centres)					188	175 (33 centres)					153	149 (30 centres)					416	†434

* Not recorded.

† (28 centres with 3 seasons' returns).

FIELD EXPERIMENTS, 1947

Experiments conducted by County Agricultural Instructors in 1947 included variety trials with spring wheat, barley and potatoes. Trials were also carried out in the use of "Agrocide" in controlling Wireworm and Leather-jacket in spring sown cereals. Further trials were carried out in the use of "Agroxone" for weed control. Details of the trials in each county may be obtained by applying to the Secretary of the Committee of Agriculture concerned.

SPRING WHEAT VARIETY TRIALS.

The results of trials conducted in 1946 in which Atle and Progress were compared were published among those of other field experiments in this Journal, Volume XLIV. Progress gave a significantly higher yield of grain and was generally superior to Atle, except that it ripened later. In 1947 further trials to compare these varieties were conducted by the Instructors in Agriculture at 58 centres in all counties. The plots were, in nearly all cases, about half an acre each and followed manured root crops. The dates of sowings are shown in the table, together with the yields of grain obtained and the relative times of ripening, for 57 centres. The crop was a failure at one centre in Sligo due to depredations by rooks and wireworm damage.

With the exception of a small number of centres indicated in the foot notes to the table, germination and subsequent progress of the crops were satisfactory. Progress was generally somewhat the more vigorous in vegetative growth.

Black Stem Rust was prevalent at 9 centres, at all of which it appeared to affect Progress the more severely. Yellow Rust was mentioned in reports from 7 centres and at 5 of these Atle appeared the more severely affected.

The straw of Progress grew somewhat longer than that of Atle, but it was strong and there was no lodging worthy of note in either variety at any centre.

The records of relative times of ripening do not reveal any pronounced difference between the varieties in this respect. Progress was the later in ripening at 22 centres, the earlier at 18 centres, while the two varieties ripened at the same time at 16 centres. The difference was not more than eight days at any centre and exceeded five days at only about six centres. This is a matter of some interest in view of the fact that Progress was noticeably later in ripening in 1946. It would seem that, in unfavourable harvest weather, Progress is slower to ripen than Atle and that there is little to choose between the two varieties in respect of earliness of ripening or relatively late sowing as in 1947.

The difference in yield of grain in favour of Progress is highly significant.

The grain of both varieties was, with few exceptions, of good quality, but about half the reports indicated that the grain of Progress was larger, plumper and of more attractive appearance than that of Atle, while in only a few cases was the grain of Atle stated to be the better.

The results of the two seasons' trials indicate that the variety Progress is generally superior to Atle. It is a better yielder and produces more attractive grain. Progress grows a heavier ear and the straw is somewhat taller, but is strong and resists lodging well. Furthermore, it has been observed in a number of cases that soil which appeared not to be quite fertile enough for Atle produced satisfactory crops of Progress, which also, at a few centres, appeared to be less susceptible than Atle to soil acidity or lime deficiency. It is also worthy of note that Progress suffered less grain damage than Atle from the unfavourable harvest weather of 1947.

	Date of Sowing	Approximate time of ripening of Progress as compared with Atle	Yield of Grain per acre			
			Atle		Progress	
			c.	q.	c.	q.
Carlow	April 12th ..	At same time	20	3	22	3
Cavan	10th ..	5 days later	12	1	10	1
	12th ..	7 days later	11	1	13	0
Clare	4th ..	3 to 4 days earlier ..	17	0	14	3
	11th ..	2 days earlier	18	2	14	2
	9th ..	At same time	20	1	25	2
Cork	5th ..	At same time	18	1	16	0
	9th ..	At same time	14	0	11	0
	10th ..	At same time	17	1	14	3
	10th ..	2 days later	8	3	7	0
	3rd ..	4 days later	9	2	14	3
1	4th ..	5 days earlier	14	2	16	1
Donegal	4th ..	3 days later	21	2	20	0
	16th ..	3 days later	8	0	8	3
Dublin	28th ..	4 days later	23	2	23	3
2	25th ..	4 days later	22	0	21	2
Galway	March 27th ..	2 days earlier	13	2	15	1
	April 10th ..	At same time	16	1	19	1
Kerry	2nd ..	2 days later	21	1	24	3
	12th ..	5 days earlier	9	2	12	3
3	3rd ..	2 days later	7	3	11	3
Kildare	15th ..	4 days earlier	15	1	18	1
	16th ..	4 days earlier	14	0	14	3
Kilkenny	16th ..	3 days later	18	3	22	0
	16th ..	4 days later	20	0	22	2

	Date of Sowing	Approximate time of ripening of Progress as compared with Atle	Yield of Grain per acre			
			Atle		Progress	
			c.	q.	c.	q.
Laoighis .. 4	April 18th ..	4 days later	16	3	21	1
	16th ..	At same time	16	2	19	1
Leitrim	2nd week	At same time	13	2	11	2
Limerick	16th ..	5 days earlier	18	3	20	1
	3rd ..	At same time	23	2	24	1
	March 25th ..	2 days later	22	0	25	1
	7th ..	7 days later	15	3	16	1
Longford	April 16th ..	2 days later	15	0	19	0
	10th ..	At same time	19	1	21	2
Louth	14th ..	4 days later	18	3	20	1
Mayo	10th ..	At same time	15	3	17	1
	3rd ..	6 days earlier	19	2	23	0
	March 30th ..	3 days earlier	16	3	17	3
Meath	April 27th ..	At same time	17	2	15	1
	8th ..	At same time	22	0	19	2
Monaghan	10th ..	4 days earlier	21	3	25	3
	May 2nd ..	5 to 6 days later ..	14	0	15	3
Offaly	April 15th ..	3 days later	22	3	19	2
	4th ..	7 days later	9	2	8	0
Roscommon ..	11th ..	8 days earlier	12	3	18	2
	4th ..	5 to 7 days later ..	16	0	18	2
Sligo	2nd ..	2 days earlier	25	1	26	2
Tipperary N.R. ..	18th ..	4 to 6 days earlier ..	5	2	8	1
5	14th ..	3 days earlier	11	2	7	0
Tipperary S.R. ..	March 26th ..	6 to 7 days earlier ..	21	1	19	3
	End of April	3 days earlier	7	0	10	0
	March 31st ..	At same time	9	1	10	2
Waterford	April 13th ..	- ..	14	2	20	1
Westmeath	10th ..	3 to 4 days earlier ..	12	2	13	3
Wexford .. 6	19th ..	At same time	8	2	9	2
7	May 3rd ..	4 days later	5	1	11	1
Wicklow	April 16th ..	At same time	21	3	22	1
Mean (57 centres) ..			15.68 cwt.		17.06 cwt.	

Standard Error 0.333 cwt.

Significant Difference (P=0.01) 0.889 cwt.

1. Establishment of the plants was poor due to wet soil. Progress made good growth subsequently, but Atle remained stagnant for some time and showed evidence of nitrogen deficiency.
2. Progress was the thinner crop.
3. While germination was good in both plots subsequent growth was poor due apparently to soil acidity. The Atle plot was regarded as a partial failure.
4. The braird was rather thin and Atle was relatively backward during vegetative growth.
5. Progress thinned out in patches and did badly from the time it was about one foot high. Atle appeared stunted from time of sowing.
6. Both varieties got a set-back in June and remained backward and thin.
7. Atle suffered more severely from wet soil.

BARLEY VARIETY TRIALS.

Trials to compare Ymer and Freja, two Swedish varieties, with Spratt Archer 37 No. 3 were conducted by the Instructors in Agriculture at 16 centres in the counties mentioned in the Table. Each plot was about one-third statute acre in area.

Except where the contrary is indicated in the remarks in the Table, germination of the seed and vegetative growth of the crops were satisfactory and the incidence of disease and pests was negligible. Ymer and Freja made more vigorous early growth than Spratt Archer at about half the centres and of the two Ymer appears to have done the better.

The straw of Ymer and Freja was very short—generally from a few inches to about a foot shorter than the straw of Spratt Archer. There was no lodging at 9 centres and of the remaining 7, Spratt Archer lodged at all, Freja at 5 and Ymer at 3.

The dates of sowing, relative times of ripening, yields of grain obtained, and other relevant observations are recorded in the Table. The trials do not reveal any significant difference between the mean yields of the three varieties.

The quality of the Spratt Archer grain was good at all centres. The grain of Ymer and Freja was generally of less uniform size, darker, and less attractive in appearance.

Compared with Spratt Archer the outstanding features of the Swedish varieties were shorter straw with greater resistance to lodging and they ripened appreciably earlier. The grain quality was not as good. Ymer, particularly, appears to be a promising variety for cultivation, at least for feeding purposes on rich land.

	Date of Sowing	Approximate number of Days ripe before Spratt Archer		Yield of Grain per Statute Acre						REMARKS
		Ymer	Freja	Spratt Archer		Ymer		Freja		
				c.	q.	c.	q.	c.	q.	
Cavan	April 15th	8	17	9	0	9	0	7	0	The three plots showed nitrogen starvation symptoms—Freja most. Spratt Archer lodged slightly. Ymer and Freja plots were very weedy and the straw was too short to tie the sheaves.
Dublin	May 16th	20	28	**		20	3	28	1	Spratt Archer commenced to lodge before earing; some lodging in others when just ripe. Freja over-ripe when harvested and shed more grain than Ymer.
Longford	April 18th	8	8	12	2	15	0	12	0	Field germination of Freja rather low. Ymer somewhat inclined to shed grain.
do.	April 14th . .	8	8	19	2	1	3	1	2	From time of heavy rainfall in May braırds of Ymer and Freja declined; by June both were very thin and patchy while Spratt Archer continued to make good progress.
Meath	April 28th . ..	7	12	14	0	14	3	15	2	—
do.	April 22nd ..	7	7	11	1	11	2	13	1	The three varieties lodged.
Monaghan	April 12th	12	12	16	0	17	3	15	3	Due to shortness of straw, Ymer and Freja were hampered in growth by Red Clover undergrowth. Spratt Archer lodged slightly in a few patches.
do.	April 4th	7	21	18	3	22	2	19	2	Some lodging in Spratt Archer; none in others. Spratt Archer most promising at ripening stage especially in respect of ear length.
Roscommon ...	April 26th	6	*	16	1	18	3	11	2	Field germination of Freja poor and plot was thin and weedy. Spratt Archer lodged most; Freja slightly.
do.	May 13th	Same time	Same time	16	0	12	2	11	2	—
Sligo	May 1st ..	5	12	20	1	18	1	19	2	—
do.	May 8th	5 to 7	9 to 13	21	1	19	3	18	2	15 per cent. Spratt Archer plot lodged; 10 per cent. Freja; some of Ymer.
Westmeath	April 30th	6	10	17	2	16	3	18	2	—
do.	April 30th	10	10	9	3	7	2	12	2	The three varieties made poor growth due to poverty of soil and wet season. Ymer and Freja developed a stunted appearance and the straw was very short. The three varieties may have suffered some damage by being grazed by sheep in spring. Some Take All disease in plots—Ymer and Freja suffered more than Spratt Archer.
Agric. School, Athenry. ...	April 10th	3	11	10	2	11	3	9	2	The three varieties brairded and grew rather thinly. Ymer plot appeared best and Spratt Archer worst.
Agric. School, Clonakilty. ...	April 7th	4	7	27	0	37	1	25	2	—
Means	1. Excluding Dublin and Longford No. 2 ..			15	3	16	2	15	0	
Means	2. Excluding Dublin only			16	0	15	2	14	0	
Means	3. Excluding Longford No. 2 only			14	2	17	0	16	0	
Means	4. All 16 centres			15	0	16	0	15	0	

* Did not ripen until 4 days after Spratt Archer—see Remarks Column.

** Spratt Archer lodged so badly that it was not harvested.

POTATO VARIETY TRIALS.

The results of trials conducted in 1946 to compare the variety Home Guard with Epicure and Arran Pilot were reported with those of other field experiments in the previous issue of this Journal, Vol. XLIV. During the 1947 season similar trials were conducted by the Instructors in Agriculture in all counties to compare the yields from the varieties Home Guard, Ulster Chieftain, Epicure and Arran Pilot. Home Guard and Ulster Chieftain were grown at 63 centres, Epicure at 61 centres, and Arran Pilot at 55 centres.

Ulster Chieftain is a first early immune variety with an oval tuber, having white skin and flesh and shallow to medium eyes. It has been much in demand since about 1943 as a substitute for Arran Pilot.

The dates of planting and digging and yields of tubers are given on the accompanying Table. Planting was abnormally late due to the wet spring. Nevertheless, the crops made good progress at the great majority of centres. Some comments on the plots at a number of centres are made in the footnotes to the Table.

Home Guard and Ulster Chieftain were compared in respect of susceptibility to blight, cooking quality and appearance of tubers.

At ten centres the incidence of blight was negligible, while at 18 centres the two varieties displayed an apparently similar degree of resistance to the disease. From 28 centres Ulster Chieftain was reported to be the less resistant and from 7 centres the more resistant.

The tubers of Home Guard were generally of satisfactory, uniform size and attractive appearance. The Ulster Chieftain produce was generally less uniform in size and less attractive in appearance. This variety tended to produce a proportion of excessively large elongate tubers.

The cooking quality of Home Guard was unsatisfactory at 6 centres, fair at 10 centres, and good at the remaining 47 centres. Ulster Chieftain was described as being similar in this respect to Home Guard at 12, somewhat better at 12, and inferior at 37 centres.

The net result of reports from about 50 centres on relative dates of maturity indicates that Epicure and Ulster Chieftain tended to mature first at about the same time, with Home Guard and Arran Pilot a few days later. As there was, however, appreciable variation in this respect between different centres, persons interested in the relative dates of maturity of the varieties locally might consult the Instructors in Agriculture in their districts.

The mean yield (from 55 centres) of ware and small tubers from Ulster

YIELD OF TUBERS PER ACRE

	Date Planted	Date of Digging	Home Guard				Ulster Chieftain				Arran Pilot				Epicure			
			Ware T. C. Q.	Small T. C. Q.	Ware & Small T. C. Q.	Diseased T. C. Q.	Ware T. C. Q.	Small T. C. Q.	Ware & Small T. C. Q.	Diseased T. C. Q.	Ware T. C. Q.	Small T. C. Q.	Ware & Small T. C. Q.	Diseased T. C. Q.	Ware T. C. Q.	Small T. C. Q.	Ware & Small T. C. Q.	Diseased T. C. Q.
CARLOW ..	—	Sept. 10th	3 15 0	0 12 3	4 7 3	—	3 15 0	1 12 0	5 7 0	—	Not included in trial				4 16 0	1 1 0	5 17 0	—
CAVAN	May 12th	Sept. 8th	7 4 0	0 15 0	7 19 0	—	7 13 0	0 1 2	7 14 2	—	11 2 0	0 8 0	11 10 0	0 8 0	8 15 0	0 12 0	9 7 0	—
	May 17th	Sept. 11th	3 9 0	0 18 0	4 7 0	0 18 0	7 0 0	0 10 0	7 10 0	0 2 0	5 14 0	0 10 0	6 4 0	0 10 0	6 18 0	0 12 0	7 10 0	0 15 0
	May 15th	Aug 27th	2 10 2	1 14 1	4 4 3	0 1 0	2 17 1	1 11 2	4 3 3	0 11 1	Not included in trial				3 9 0	1 17 1	5 6 1	0 8 0
CLARE	April 15th	Aug. 11th	6 3 0	1 0 0	7 3 0	0 14 1	6 8 2	1 14 1	8 2 3	1 5 3	—	—	—	—	—	—	—	—
	May 10th	Sept 5th	11 2 3	2 1 2	13 4 1	—	9 18 2	2 5 3	12 4 1	0 1 2	12 4 1	1 18 2	14 2 3	—	8 0 0	2 18 2	10 18 2	0 7 1
	May 2nd	Aug. 2nd	7 14 1	1 1 2	8 15 3	—	8 2 3	1 2 3	9 5 2	—	—	—	—	—	—	—	—	—
CORK ...	April 30th	Sept. 19th	4 5 3	1 17 0	6 2 3	—	5 11 2	0 17 0	6 8 2	—	Not included in trial				5 8 2	1 2 3	6 11 1	—
	April 11th	—	5 8 2	1 8 2	6 17 0	—	4 0 0	0 17 0	4 17 0	—	6 0 0	0 17 0	6 17 0	—	4 17 0	1 2 0	5 19 0	—
	April 28th	Oct. 15th	11 11 0	1 8 2	12 19 2	—	10 8 2	1 [illegible] 3	11 19 1	—	14 0 0	1 11 0	15 11 0	—	13 5 3	1 11 2	14 17 1	—
	May 20th	Aug. 13th	6 3 0	1 7 0	7 10 0	0 5 2	4 3 0	0 16 0	4 19 0	—	6 3 0	2 11 0	8 14 0	—	4 11 2	1 1 0	5 12 2	—
	April 15th	Aug. 22nd	5 14 0	0 12 0	6 6 0	0 2 0	4 4 0	0 12 0	4 16 0	0 18 0	4 0 0	1 5 0	5 5 0	0 8 0	4 16 0	1 0 0	5 16 0	0 4 0
	April 28th	Aug 19th	7 5 2	3 12 3	10 18 1	—	5 4 3	1 6 2	6 11 1	—	4 16 0	1 5 1	6 1 1		7 10 0	3 7 1	10 17 1	—
DONEGAL 1	May 2nd	Sept. 2nd	5 10 0	1 14 1	7 4 1	0 1 2	5 11 0	1 5 3	6 16 3	0 9 1	6 4 0	1 2 0	7 6 0	0 2 3	6 4 0	1 11 0	7 15 0	0 1 2
	April 22nd	Aug. 21st	11 9 3	2 1 1	13 11 0	—	10 6 1	0 11 3	10 18 0	0 6 0	16 10 0	1 15 3	18 5 3	0 2 0	14 14 3	1 3 2	15 18 1	—
DUBLIN ..	April 20th	July 11th	14 8 2	0 11 2	15 0 0	—	8 13 0	1 5 1	9 18 1	—	11 16 1	1 3 3	13 0 0	—	11 11 3	0 17 2	12 9 1	—
	May 8th	Oct. 27th	9 4 0	2 12 2	11 16 2	—	9 12 2	2 12 1	12 4 3	—	11 19 0	4 10 2	16 9 2	—	7 11 3	1 10 0	9 1 3	—
	April 25th	Aug. 18th	6 1 2	1 8 1	7 9 3	1 4 1	3 1 2	0 15 0	3 16 2	5 17 2	5 11 2	1 8 0	6 19 2	0 5 0	7 18 0	1 10 1	9 8 1	0 18 1
GALWAY ...	April 26th	Sept. 26th	6 12 3	1 2 3	7 15 2	—	3 8 2	1 0 0	4 8 2	—	4 0 0	0 12 2	4 12 2	—	5 5 3	1 2 3	6 8 2	—
	May 13th	Sept. 19th	5 13 3	1 11 2	7 5 1	—	7 17 1	1 5 3	9 3 0	—	10 1 2	1 11 2	11 13 0	—	9 5 3	1 7 1	10 13 0	—
	May 3rd	End of Sept.	10 17 1	1 0 0	11 17 1	0 5 3	9 8 2	0 17 1	10 5 3	0 11 2	14 5 3	0 11 2	14 17 1	0 11 2	11 2 3	0 17 1	12 0 0	0 8 2
KERRY ...	April 15th	Sept. 23rd	13 16 0	0 12 2	14 8 2	—	14 0 0	0 9 0	14 9 0	—	14 0 0	0 6 0	14 6 0	—	14 6 0	1 0 0	15 6 0	—
2	April 28th	Oct. 8th	4 5 2	1 1 2	5 7 0	—	6 4 2	1 6 0	7 10 2	—	1 15 0	0 3 0	1 18 0	0 8 0	5 0 0	2 11 0	7 11 0	—
	April 24th	Sept. 9th	8 17 1	1 11 2	10 8 3	0 3 2	6 8 2	1 1 2	7 10 0	1 0 0	3 3 0	1 1 2	9 4 2	0 1 2	8 0 0	1 8 2	9 8 2	1 2 3
KILDARE ...	April 24th	Aug. 20th	6 3 3	1 1 2	7 5 1	0 4 3	5 11 0	0 15 2	6 6 2	1 10 1	8 5 1	0 13 0	8 18 1	0 8 2	7 14 0	0 17 1	8 11 1	0 12 3
	May 10th	Sept. 24th	7 4 0	0 18 2	8 2 2	0 3 1	9 3 1	0 6 3	9 10 0	0 0 1	Not included in trial				8 18 1	0 14 2	9 12 3	0 6 1
KILKENNY ...	May 2nd	Oct. 9th	9 14 1	0 11 1	10 5 2	—	10 17 0	0 17 0	11 14 0	0 2 3	Not included in trial				8 11 1	0 17 0	9 8 1	—
LAOIGHIS ...	—	Sept. 24th	1 6 0	1 6 0	2 12 0	—	2 18 0	1 18 0	4 16 0	—	4 3 0	0 19 0	5 2 0	0 3 1	3 17 0	1 12 0	5 9 0	0 4 3
	April 24th	Sept. 26th	4 17 0	0 11 1	5 8 1	0 2 0	5 0 0	0 11 1	5 11 1	0 2 0	5 0 0	0 14 1	5 14 1	0 1 2	6 5 2	0 14 1	6 19 3	—
	April 28th	Sept. 30th	5 14 0	1 0 0	6 14 0	0 6 2	5 11 1	0 14 0	6 5 1	0 2 0	5 0 0	0 14 1	5 14 1	0 1 2	5 17 0	0 17 0	6 14 0	0 2 3
LEITRIM 3	March 18th	Oct. 17th	10 3 2	1 6 0	11 9 2	0 2 0	10 12 2	1 10 0	12 2 2	0 1 2	11 5 0	1 1 0	12 6 0	0 3 0	9 0 1	1 16 0	10 16 1	0 9 0
LIMERICK .	April 22nd	Sept. 10th	12 10 0	1 10 0	14 0 0	—	7 10 0	1 0 0	8 10 0	0 5 0	12 0 0	1 5 0	13 5 0	0 5 0	10 0 0	1 0 0	11 0 0	0 5 0
	April 8th	Sept. 3rd	10 8 2	3 1 0	13 9 2	—	7 15 2	1 8 3	9 4 1	0 0 2	8 5 1	1 10 2	9 15 3	0 0 2	8 0 3	1 5 2	9 6 1	0 0 1
	—	Sept. 10th	6 0 3	1 11 0	7 11 3	1 4 0	2 2 0	0 14 0	2 16 0	3 9 1	2 2 0	2 2 0	4 4 0	—	10 8 0	0 13 0	11 1 0	0 3 1
	March 10th	Sept. 4th	7 8 2	0 9 2	7 18 0	0 3 0	3 14 3	0 4 0	3 18 3	0 3 2	8 6 1	0 6 1	8 12 2	0 1 2	9 4 3	0 8 1	9 13 0	—
LONGFORD 4	May 1st	Oct. 1st	7 3 0	0 15 0	7 18 0	0 2 0	5 5 0	0 10 2	5 15 2	0 3 0	8 0 0	0 10 0	8 10 0	0 2 2	8 14 1	0 17 0	9 11 1	—
	May 12th	Oct. 31st	6 1 1	0 12 3	6 14 0	0 2 3	5 8 2	0 14 1	6 2 3	—	5 10 0	0 14 1	6 4 1	—	6 12 3	0 10 1	7 3 0	—
LOUTH ... 5	May 13th	Oct. 23rd	5 8 2	0 19 3	6 [illegible] 1	0 2 0	2 15 2	0 15 3	[illegible] 11 1	0 2 0	6 1 2	0 19 0	7 0 2	0 2 2	4 14 0	0 19 2	5 13 2	0 2 2
MAYO . .	May 9th	Aug. 25th	8 0 3	1 0 2	9 1 1	—	8 5 0	1 15 0	10 0 0	0 5 0	7 5 0	1 5 2	8 10 2	0 2 0	8 10 0	1 10 0	10 0 0	—
	May 7th	Sept. 23rd	11 15 0	1 5 0	13 0 0	—	10 8 0	2 1 0	12 9 0	0 11 0	11 10 1	2 1 0	13 11 1	—	10 15 0	1 15 0	12 10 0	—
	April 23rd	Oct. 3rd	10 12 3	1 1 2	11 14 1	0 1 2	10 18 2	1 12 3	12 11 1	0 5 3	9 17 1	1 11 2	11 8 3	0 5 3	11 15 3	1 0 0	12 15 3	—
MEATH . . .	May 2nd	Sept. 6th	3 9 3	0 12 2	4 2 1	—	7 3 2	0 14 0	7 17 2	—	4 16 1	0 13 0	5 9 1	—	5 18 2	1 1 0	6 19 2	—
	May 12th	Oct. 17th	7 16 2	0 15 1	8 11 3	0 12 2	6 10 2	0 18 1	7 8 3	0 6 3	4 13 0	0 17 2	5 10 2	0 5 1	7 3 1	0 19 2	8 2 3	0 4 3
	May 9th	Oct. 18th	2 13 1	0 8 3	3 2 0	—	2 13 1	0 10 0	3 3 1	—	2 13 1	0 5 2	2 18 3	—	3 6 3	0 8 3	3 15 2	—
MONAGHAN ...	May 13th	Oct. 17th	6 18 2	0 7 1	7 5 3	0 10 0	6 8 2	0 14 1	7 2 3	0 7 1	Not included in trial				5 18 2	0 15 3	6 14 1	0 8 2
OFFALY 6	April 30th	Sept. 18th	8 11 2	1 2 3	9 14 1	0 1 2	7 17 1	1 11 2	9 8 3	0 5 3	5 17 1	1 0 0	6 17 1	—	10 5 3	1 11 2	11 17 1	0 5 3
7	May 12th	Oct. 25th	1 17 0	3 11 2	5 8 2	0 17 0	1 4 1	3 0 0	4 4 1	1 2 0	3 8 2	2 0 0	5 8 2	0 16 3	2 0 0	6 5 3	8 5 3	0 17 0
ROSCOMMON ...	April 5th	—	7 3 1	2 5 2	9 8 3	0 9 3	7 2 1	3 0 1	10 2 2	0 11 0	10 7 0	1 5 3	11 12 3	0 13 2	9 0 2	1 15 3	10 16 1	0 7 1
	May 9th	Mid. Sept.	7 10 2	1 0 0	8 10 2	—	7 0 0	1 1 0	8 16 0	—	5 16 0	1 4 0	7 0 0	—	6 12 0	1 10 0	8 2 0	—
SLIGO ... 8	April 16th	—	8 14 0	0 9 0	9 3 0	0 3 0	8 6 0	0 12 0	8 18 0	0 6 0	10 17 0	0 15 0	11 12 0	1 2 0	10 19 0	0 18 0	11 17 0	0 4 0
	April 14th	Sept. 23rd	9 17 2	0 11 0	10 8 2	—	9 1 2	0 9 0	9 13 2	—	10 3 0	0 6 0	10 9 0	—	8 9 0	0 18 0	9 7 0	—
TIPPERARY N.R.	April 30th	Sept. 15th	4 15 2	1 3 1	5 18 3	0 4 3	6 4 0	0 12 0	6 16 0	0 7 1	5 14 1	0 17 1	6 11 2	0 5 0	7 12 0	0 13 2	8 5 2	0 6 0
	April 16th	Aug. 23rd	4 0 3	0 19 0	4 19 3	0 8 2	5 1 2	0 15 1	8 16 3	0 1 0	3 1 1	1 6 2	4 7 3	0 2 3	8 8 2	0 14 0	9 2 2	0 4 1
TIPPERARY S.R.	April 2nd	End of Aug.	6 0 0	1 4 0	7 4 0	—	7 0 0	1 4 0	8 4 0	0 0 2	5 10 0	0 15 0	6 5 0	0 0 2	6 0 0	0 13 0	6 13 0	0 0 2
	April 25th	Sept. 4th	4 0 0	0 17 2	4 17 2	1 0 0	1 5 0	0 10 0	1 15 0	1 5 0	1 17 2	0 5 0	2 2 2	0 12 2	5 0 0	1 0 0	6 0 0	1 0 0
	April 18th	Aug. 30th	5 12 0	0 8 2	6 0 2	—	4 15 0	0 9 3	5 5 2	0 1 0	4 19 1	0 12 0	5 11 1	0 3 1	5 14 2	0 10 3	6 5 1	0 2 0
WATERFORD ...	April 19th	July 30th	6 0 0	1 2 2	7 2 2	—	7 17 2	0 19 0	8 16 2	—	5 6 3	0 9 2	5 16 1	—	7 2 2	0 12 3	7 15 1	—
9	April 12th	Sept. 23rd	6 14 0	0 14 0	5 8 0	0 2 1	4 14 1	0 8 0	5 2 1	0 3 0	8 11 1	1 11 1	10 2 2	—	8 17 0	1 11 0	10 8 0	0 2 0
WESTMEATH 10	May 1st	Aug. 27th	4 14 0	1 3 0	5 17 0	0 2 0	4 6 0	1 3 0	5 9 0	0 1 0	6 19 0	1 8 0	8 7 0	0 1 0	4 13 0	1 1 0	5 14 0	0 11 0
11	April 18th	Sept. 15th	9 0 0	2 15 0	11 15 0	—	10 0 1	3 4 3	13 5 0	—	9 14 3	2 0 0	11 14 3	—	7 18 1	3 9 2	11 7 3	—
WEXFORD ...	—	June 26th	4 2 3	2 5 0	6 7 3	—	7 0 0	2 10 0	9 10 0	—	5 0 0	2 0 0	7 0 0	—	6 6 0	1 14 0	8 0 0	—
	April 12th	June 23rd	4 3 0	0 8 0	4 11 0	—	4 0 0	0 7 0	4 7 0	—	7 14 0	1 14 0	9 8 0	—	5 3 0	0 4 0	5 7 0	—
WICKLOW ..	April 22nd	Sept. 23rd	7 0 0	1 17 1	8 17 1	—	6 14 1	2 2 [illegible]	8 17 0	—	4 14 1	1 5 3	6 0 0	—	6 2 3	2 8 2	8 11 1	—
Mean Yield: 55 centres ...			7 4 1	1 5 3	8 9 0	0 3 2	6 11 0	1 3 0	7 14 0	0 7 2	7 8 2	1 3 0	8 11 2	0 3 1	7 14 0	1 6 2	9 0 2	0 3 3
61 centres ...															7 11 0	1 6 0	8 17 0	0 3 3
63 centres .			7 0 2	1 5 0	8 5 2	0 3 2	6 11 1	1 2 3	7 14 0	0 7 1								

1. Wet season unfavourable to crop on this soil and the produce was generally of small grade.
2. There were many "blanks" in the plots, particularly that of Arran Pilot, due to Dry Rot.
3. There were some "blanks" in the Home Guard plot.
4. There were "blanks" to the extent of 15 to 20 per cent. of the whole plot in Ulster Chieftain and to the extent of about 5 per cent. in Home Guard.
5. In addition to late planting, due to wet condition of the soil, the foliage was destroyed by Blight towards the end of July.
6. Epicure and Arran Pilot sprouts came overground about two weeks earlier than Home Guard and Ulster Chieftain.
7. The Ulster Chieftain tubers were mostly very small and of poor appearance, probably due to early destruction of the tubers by Blight.
8. There were many "blanks," due apparently to frosting of the tubers, particularly in the Home Guard and Ulster Chieftain plots, there were none in Epicure.
9. There were many "blanks" in the Ulster Chieftain plot.
10. Both Home Guard and Ulster Chieftain showed more resistance to Common Scab than Epicure.
11. There was a fair amount of Common Scab on the Ulster Chieftain tubers and very little on those of Home Guard

Chieftain was significantly lower than the yields from the other three varieties, which were similar.

This season's trials again indicate that Home Guard has a yielding capacity similar to that of Epicure and Arran Pilot; that it is not inferior to these varieties in respect of susceptibility to blight; that it matures at approximately the same time, and that it produces uniform attractive tubers of satisfactory table quality. Ulster Chieftain has, in this season's trials, yielded significantly lower than the other three varieties; it appeared to be more susceptible to blight than Home Guard, and, generally, produced less uniform and less attractive tubers of poorer cooking quality.

TRIALS WITH AGROCIDE.

Preliminary trials in the use of Agrocide as a means of control of Wireworm and Leather Jacket in spring sown cereals were carried out by the Instructors in Agriculture during 1946 in practically all counties. Since supplies of Agrocide could not be delivered in time to allow of its being incorporated with the soil before sowing the cereals, application was not effected until the cereals were in full braird, and in most cases recovering from Wireworm and Leather Jacket attacks. Consequently, these preliminary trials were unsatisfactory.

During 1947 further trials were carried out in the use of Agrocide in controlling Wireworm and Leather Jacket as follows:—

On Wireworms:

Trials with Agrocide for the control of wireworms in spring wheat and oat crops were conducted by the Instructors in Agriculture at 102 centres in 22 counties. At the great majority of the centres, 2 or more plots of ⅛ to ½ acre each were treated, the material being applied at the rate of 2 cwt. per acre.

At 86 centres the dressing was applied before or about the time of sowing the cereal. At 53 of these there was no attack by the pest; at 8 there was a slight attack of which there was some measure of control at 4, and no apparent control at the other 4; at 25 there was appreciable or severe attack, of which effective control was observed at 10 centres, fair to good control at 4 centres, slight control at 7 centres, and no apparent control at 4 centres.

At 13 centres the dressing was applied when the cereal was in braird. Of these, there was no attack by the pest at 3 centres, severe attack which was effectively and slightly checked at 5 centres and 1 centre, respectively, and severe attack of which there was no apparent check or control at 4 centres.

At 3 centres the dressing was applied to plots laid down on a second crop sown after one which had been destroyed by the pest. At one of these centres

wheat was sown early, but, due to wireworm damage, it was ploughed down, and the plot was re-sown immediately after applying the Agrocide, part being allowed to remain undressed to serve as a control. The second crop showed no evidence of wireworm attack on the dressed plot, while the control showed definite evidence of wireworm damage. At the second centre oats was re-sown, part of the ground having been treated with Agrocide. The second crop showed no evidence of attack in the dressed plot, whilst in the control there was definite evidence of wireworm damage. At the third centre spring wheat was ploughed down as a result of wireworm damage, and oats was sown on 16th May. The Agrocide was applied a week later and the ground rolled. Both treated and untreated areas were later equally affected by wireworm attack, and it was considered that no benefit resulted from the dressing.

Some stimulation of growth of the cereal crop on the plot treated with Agrocide as compared with the untreated crop was reported from 3 centres where there was no or negligible attack by the pest. At 1 of these centres oats was stated to have grown somewhat longer on the treated plot. At a second the treated plot of oats was stated to be more forward in the early stages of growth, and at the third the wheat in the treated plot was stated to be darker in colour. At about 50 centres, however, where there was no apparent attack by the pest, the dressing did not appear to have any stimulating effect on the crop.

From a few centres it was reported that the Agrocide was difficult to apply because of its fineness and that its smell is very objectionable.

On Leather-Jacket Grubs:

Trials in similar plots for control of Leather-Jacket grubs were conducted at 30 centres.

At 15 centres, at 9 of which the dressing was applied before the cereal was sown, and at 6 after it was sown or when in braird, there was no attack.

At 9 centres there was severe attack, and the following results were obtained:

Effective control ..	3 centres	Dressing applied	before cereal sown ..	1 centre
		,, ,,	a week after cereal sown	1 ,,
		,, ,,	when cereal in braird ..	1 ,,
Lesser but appreciable degree of control.	4 centres	,, ,,	before cereal sown ..	1 ,,
		,, ,,	when cereal in braird ..	2 ,,
		,, ,,	to flax crop in braird ..	1 ,,
No control	2 centres	,, ,,	when cereal in braird.	

At 5 centres there was a noticeable, but not severe, attack, with the following results:—

Slight control ..	1 centre	Dressing applied	before cereal was sown.	
No control	4 centres	,, ,,	,, ,, ,, ,,	3 centres
		,, ,,	when cereal in braird ..	1 centre

At 1 centre, in County Wexford, a wheat crop sown on 21st April was destroyed by Leather-Jacket grubs. On 13th May, Paris Green bait was applied to 9 acres, leaving 1 acre for an Agrocide trial. The entire area was ploughed next day, and 2 plots of ¼ acre each were treated with Agrocide. On the 15th May the field was re-sown with Diamante wheat. A full normal crop grew on the area treated with Paris Green, which appeared to give practically complete control of the grubs. The crop on the control area and on the plots treated with Agrocide was severely attacked by the grubs. In July the crop appeared to be normal in the Paris Green treated plot, 20% of normal crop on the Agrocide treated plot, and 5% normal on the control areas.

REPORTS ON PLOTS TREATED IN 1946.

Reports were received from 18 centres where Agrocide was applied in 1946 to cereal crops, which were followed by cereals again in 1947. At 13 centres there was little or no damage done to the crop in either treated or untreated plot. The results obtained at the remaining centres were as follows:—

1. In Co. Dublin, ¼-acre of oats in braird was treated with Agrocide in 1946, when there was a fairly severe attack of wireworm in patches throughout the field. The dressing did not appear to check it. In 1947 the field was again cropped with oats. The plots which had not been treated in the previous year were severely attacked by wireworms, resulting in a thin, patchy crop. The plots that had been treated were not attacked, and, in contrast with the others, carried a thick, even braird.

2. In Roscommon, ½ an acre, comprising 3 plots in a brairded spring wheat crop which was being damaged by wireworms, was dressed with Agrocide which checked the attack. The ground was sown with oats and wheat in 1947. The oats grew longer and more vigorous in the plots treated with Agrocide in 1946 than in the plots not so treated—they looked by comparison as if they were dressed with fertilisers in 1947. The wheat grown on the plots treated in 1946 was also more vigorous than in the plots not so treated, that in the latter being relatively backward, thin and short.

3. In Co. Waterford, four ⅛-acre plots of brairded spring wheat were treated in 1946. Although there was a fairly severe attack of wireworm, no difference developed between the treated and untreated plots. Barley sown in the plots in 1947 was much more vigorous in May in the plots which had been treated than in the controls.

4. In Co. Westmeath, 4 plots of about ⅛-acre each were treated when the spring wheat crop was in braird. Although wireworms were present in the soil, no appreciable damage to the crop became apparent. In May this year a heavy infestation of wireworms was found on the plots not treated in 1946. Wireworms were also found in the plots which had been treated, but the

infestation was less severe. The cereal outgrew the attack on both plots without suffering appreciable injury.

5. In Co. Wicklow, five ⅛-acre plots of oats were treated with Agrocide after the seed was sown, but before the seedlings emerged overground. There was only a slight wireworm attack on both treated and untreated plots, and the effectiveness of the dressing could not be assessed. Three of the 5 plots treated in 1946, together with alternating control plots, were sown with oats in 1947. Wireworm damage was extensive this year on 2 of the untreated plots, while there was no evident damage on the treated plots. The dressing was considered to have given very good control in this season.

TRIALS WITH AGROXONE FOR WEED CONTROL.

The results of trials conducted in 1946 with Agroxone spray for control of weeds in cereal crops were published in the previous issue of this Journal, Volume XLIV. Further trials were conducted by the Instructors in Agriculture in 1947. There were two series of plots: (a) where weeds of the genus Brassica were prevalent, and (b) where one or more species of other weeds predominated. The rate of application aimed at was 1 gallon of Agroxone per acre in 100 gallons of water in the case of the Brassica weeds, 3% copper sulphate solution being used on adjacent plots for comparison; and four different rates—namely, 1, 2, 3 and 4 gallons of Agroxone, each in 100 gallons of water, per acre in the case of other weeds. These rates of application of Agroxone are referred to hereafter in this report as 1%, 2%, 3% and 4% sprays.

The sprays were applied in May or June in nearly all cases. The weather was fine at the great majority of the centres on the day the spray was applied. Reports from a relatively small number of centres indicated that heavy rainfall shortly after application of the spray reduced its efficacy to a noticeable extent.

Some discoloration or check to vigour of the cereal was mentioned in 32 out of 138 reports on wheat crops; 21 out of 102 reports on oat crops, and 11 out of 31 reports on barley crops. Such effects as were noticed were generally of little consequence, and were caused mainly by the 3% or 4% spray. In about half-a-dozen cases the crops appeared to be checked appreciably for a while, but even in these cases the damage was not sufficient to prevent subsequent apparently satisfactory progress of the crops. In three cases, however, where 5% spray was used the wheat crops were severely checked in growth.

Both Brassica and other weeds were in various stages of growth when sprayed. The Brassica species were destroyed in the various stages from seedlings to plants in full flower, but it was apparent in a few instances that they were more resistant when they reached the late flowering or podding stage. There is little evidence from the trials that better control of any of the other species may be consistently obtained by spraying at any particular stage of growth. In the case

of annuals; early spraying was generally favoured. Redshank was specifically mentioned in this connection in about half-a-dozen cases. Docks and Creeping Thistles were each mentioned in a few instances as having suffered more severe injury when sprayed in an advanced stage of vegetative growth.

Tables I and II show the number of centres at which each of the weeds was affected as indicated. The description " checked in growth " includes various degrees of injury to the overground organs of the weed, from slight effects to severe discoloration or distortion. In many cases the extent of this damage was sufficient to prevent seeding or to give the crops an advantage in growth which enabled them to keep the weeds suppressed. Nevertheless, at the majority of centres where the weeds were only checked in growth, they recovered to different extents within various spaces of time, and were not considered to have been satisfactorily controlled.

Charlock (Brassica Sinapis) and Wild Turnip (B. campestris) were, with a few exceptions in each case, effectively destroyed by 1% Agroxone spray. Wild Radish was destroyed at 4 of the 6 centres, and damaged at the other 2. Shepherd's Purse, which in 1946 was destroyed at the 2 centres where it was prevalent, was unaffected at 2 centres, and checked in growth at 3 centres in 1947. 3% copper sulphate solution was less reliable for the destruction of these weeds, particularly Wild Turnip.

It is evident from Table II that, except in the case of a few species, the 1% spray destroyed the weeds at only a small proportion of centres. The 2% spray was generally better, while the 3% and 4% rates gave promising results on most of the weeds.

Vetches were destroyed by the 1% and 2% sprays at 6 out of 7 centres in each case. This result conflicts with that of 1946 when Vetch species were unaffected by 1% spray at 7, and destroyed at only 3 of 11 centres. Marsh Woundwort also appears from the 1947 results to be more susceptible to injury by the spray at even the lower rates than the 1946 results suggested.

Stinging Nettle and Groundsel were each sprayed at only a small number of centres in 1947. The two seasons results suggest that these species and also Creeping Crowfoot and Creeping Thistle may be amenable to a useful degree of control by 2% spray. The 4% spray gave, however, more consistent destruction of Crowfoot, and both the 3% and 4% sprays gave appreciably better results than 2% on Creeping Thistle.

In the case of Docks, more reliable results were obtained as the strength of the spray was increased, but even with 4% spray there was incomplete destruction or re-growth of the overground organs at 18 of 43 centres.

Lamb's Quarter, Hemp-nettle, White Dead-nettle, Annual Sowthistle, Poppies

and Mint were destroyed by the 3% and 4% sprays at a high proportion of the centres, and remained unaffected at very few.

Silverweed was destroyed by 3% spray at 10 out of 27 centres, but the results were more consistent with 4% spray, which gave promising results also on Red Dead-nettle.

Common Chickweed and Redshank were destroyed by the 4% spray at upwards of half the centres, and injured at practically all of the remainder. Less favourable results were obtained with the weaker sprays.

Corn Spurrey and Coltsfoot were destroyed at few centres even by the 4% spray.

Corn Marigold, Oxeye Daisy and Cleavers have proved very resistant in both seasons.

The following Table shows the number of centres at which the perennating organs of the weeds mentioned were affected as indicated:—

	Decayed or considerably damaged	Less severely but appreciably damaged	Slightly damaged	Unaffected
Creeping Thistle	21	23	1	8
Docks	12	19	8	8
White Dead-nettle ..	1	1	—	2
Coltsfoot	1	2	2	5
Perennial Sowthistle ..	1	1	—	2
Stinging Nettle	2	2	1	1

The spray, particularly the 3% and 4% rates, caused appreciable damage to the rhizomes of Creeping Thistle and the roots of Docks. The rhizomes of Coltsfoot appear to be more resistant. It was mentioned at 2 centres that where Creeping Thistles had been treated in 1946 they made, in one case, negligible growth in 1947, and in the other case very much less than in 1946.

SUMMARY.

The results of the two seasons trials show that 1% Agroxone spray applied at the rate of about 100 gallons per acre is very effective for the destruction of Charlock, Wild Turnip, and the other Brassica weeds sprayed, with the

possible exception of Shepherd's Purse. It is more reliable for this purpose than 3% Copper Sulphate solution, causes less injury to the cereal crop, is less likely to have its efficacy impaired by rainfall shortly after its application, and is more convenient to use. These weeds were destroyed by the spray in various stages of growth up to the late flowering stage, but in order to eliminate their competition with the crop it is advisable to destroy them when in the seedling stage.

Although results were more erratic with other weed species, a number of them appear to be amenable to control by Agroxone spray. These include, Stinging Nettle, Creeping Crowfoot, Creeping Thistle, Docks, Lambs' Quarter, Groundsel, Hemp-nettle, Silverweed, Dead-nettle, Annual Sowthistle, possibly also Marsh Woundwort, Vetches and Poppies, and, to a lesser extent, Common Chickweed and Redshank. Coltsfoot and Corn Spurrey were more resistant to the effects of the spray, while Cleavers and Corn Marigold were very resistant. In the case of most of these species, appreciably better results were obtained with 2%, 3% or 4% spray than with 1%.

The destructive effects of the spray extend to a greater or lesser extent to the underground perennating organs on some at least of the perennial weeds, including Creeping Thistle, Docks and Stinging Nettle.

While Agroxone spray, particularly the 3% or 4% rates, caused some check to the cereal crops in a number of cases, the danger was not such as would be a deterrent to the use of the spray on weed-infested crops.

While at some centres the efficacy of the spray was noticeably reduced by heavy rainfall shortly after spraying, light or moderate rainfall on the day of application does not appear to affect it to any appreciable extent.

Agroxone causes injury to tillage crops other than cereals, and even wind drift of the spray on to them should be avoided. If applied to pasture it is likely to destroy the clovers present. It has been claimed that Agroxone at low rates of application may be used on flax crops, which were not, however, included in these trials.

TABLE I.—Brassica Species.

	1 Per Cent. Agroxone			3 Per Cent. Copper Sulphate		
	Unaffected	Checked in Growth	Destroyed	Unaffected	Checked in Growth	Destroyed
Charlock	—	3	133	—	17	107
Wild Turnip	—	3	38	—	14	24
Wild Radish	—	2	4	—	2	1
Shepherd's Purse	2	3	—	1	1	—

TABLE II.—Other Species.

	1 Per Cent.			2 Per Cent.			3 Per Cent.			4 Per Cent.		
	Un-affected	Checked in Growth	Over-ground organs destroyed	Un-affected	Checked in Growth	Over-ground organs destroyed	Un-affected	Checked in Growth	Over-ground organs destroyed	Un-affected	Checked in Growth	Over-ground organs destroyed
Stinging Nettle	—	—	1	1	1	2	1	—	3	—	1	1
Crowfoot (Ranunculus repens)	7	13	1	4	9	9	2	9	12	—	7	14
Creeping Thistle	6	33	9	3	28	22	—	18	34	—	8	48
Docks	6	36	1	4	30	11	3	23	17	2	16	25
Lamb's Quarter	1	6	1	1	6	1	—	2	7	—	2	6
Groundsel	—	1	1	—	—	2	—	—	3	—	—	3
Corn Spurrey	15	11	—	8	14	2	4	14	4	5	16	3
Hemp-nettle	3	9	1	—	10	3	—	4	7	—	2	9
Speedwell	1	2	—	1	2	—	—	2	1	—	2	1
Marsh Woundwort	—	3	3	—	2	4	—	1	4	—	—	6
Common Chickweed	14	12	2	10	17	3	4	18	7	2	15	12
Corn Marigold	12	3	—	12	3	—	9	6	—	5	10	—
Oxeye Daisy	3	—	—	1	1	—	1	1	—	2	—	1
Redshank	36	21	3	18	30	8	6	35	18	3	29	26
Silverweed	11	11	5	5	16	7	1	16	10	—	9	13
Red Dead-nettle	4	4	1	3	4	1	1	6	2	—	2	6
White Dead-nettle	—	3	2	—	3	2	—	1	4	—	—	6
Sowthistle (Annual)	2	2	1	2	3	2	—	3	4	—	3	4
do. (Perennial)	1	1	—	—	3	—	—	1	—	—	2	—
Common Sorrel	2	2	—	1	1	1	—	3	1	—	3	1
Sheep Sorrel	2	1	—	2	1	—	1	1	—	1	1	—
Coltsfoot	11	5	—	8	7	1	5	10	1	5	9	2
Knotgrass	3	1	1	2	2	1	1	4	1	—	4	1
Black Bindweed	2	1	1	2	1	—	—	2	1	—	1	2
Poppies	1	2	2	1	1	3	—	1	4	—	1	4
Mint	2	1	2	1	2	2	—	2	2	—	1	4
Vetches	1	—	6	—	1	6	—	—	5	—	—	4
Cleavers	5	1	—	5	—	1	3	2	—	3	2	—

CEREAL VARIETY TRIALS AT DEPARTMENT'S FARMS, 1947

1. OATS.

Half drill strip experiments were conducted at Athenry, Ballyhaise and Clonakilty to compare Glasnevin Triumph and Ardrí. There were ten half strips three chains long of each variety.

The seed was sown at the rate of sixteen stones per acre on 9th April at Athenry, on 5th April at Ballyhaise and on 2nd April at Clonakilty. Field germination and establishment of both varieties was similar and satisfactory at the three schools.

At Athenry, Triumph was slightly more vigorous in growth than Ardrí early in June, just before the varieties came into ear.

At Ballyhaise, both varieties developed a pale green colour, considered to be due to nitrogen deficiency promoted by the continuous wet condition of the soil. There was no apparent difference between the varieties in the dates of earing or ripening or in length of ear or plumpness of grain.

At Clonakilty, Triumph eared out about a week before Ardrí. The Ardrí plants were shorter and the crop more uniform than in the case of Triumph. About one-third of the plants in the latter variety were 3" or 4" taller than the remainder. The two varieties ripened at the same time.

There was no disease and no lodging at any of the three centres.

The yields of grain from the plots are shown on accompanying table. There was no significant difference between the yields of the two varieties at any of the three centres.

YIELD OF GRAIN PER DRILL-STRIP IN LB.

	Athenry		Ballyhaise		Clonakilty	
	Ardrí	Triumph	Ardrí	Triumph	Ardrí	Triumph
	63	83	80	48.5	72	88
	77	71.5	45	41.5	80	91
	69	72	37	36	89	94
	79	69	43.5	39.5	87	92
	71	84	38.5	30	104	95
	71	82	45	45	94	98
	70.5	78	51	46	98	99
	63	59.5	54	53	88	84
	67	79.5	38	51	89	94
	64.5	79	34	43	90	96
Means	69.5	75.75	41.6	43.35	89.1	93.1
Differences ..		6.25		1.75		4.0
S.E. of Mean Differences ..		2.950		2.767		2.260

t for 9 degrees of freedom (at $P=0.05$)$=2.262$

2. SPRING WHEAT.

Drill strip experiments were conducted at Athenry, Ballyhaise and Clonakilty to compare Atle and Progress. There were 12 drill strips three chains long of each variety at each centre. The plots were sown on 20th March at Athenry, on 17th April at Ballyhaise and on 2nd April at Clonakilty. The rate of seeding was 18 stones per acre at Athenry, 16 stones at Ballyhaise and 16 stones at Clonakilty.

At Athenry, there was no difference in establishment of the varieties, but Progress had a noticeably darker green and wider leaf blade than Atle. Progress appeared to be making more vigorous growth in June and was slightly earlier in earing. Both varieties flowered together in mid-July. Progress was then taller with a wider leaf blade, thicker stem and a longer ear, but the number of spikelets per ear was no greater than in Atle. There was no difference in time of ripening; the plots were harvested on 30th August.

At Ballyhaise, both varieties came overground together, but Atle was more vigorous in establishing itself and made more rapid progress at the beginning. After about a month Atle began to suffer badly from nitrogen deficiency, while

Progress seemed to suffer little from this condition and made steady progress, being more vigorous and longer than Atle. There was no difference in time of earing. Progress continued to be more vigorous and had a better head. Atle showed a very slight attack of Loose Smut, from which Progress was free. The straw of Progress seemed to ripen first, but the grain of Atle ripened earlier by about three days. The plots were harvested on 3rd September.

At Clonakilty, Atle produced a slightly thicker braird and seemed to remain thicker throughout the season. There was no apparent difference in dates of earing. Progress grew taller than Atle and appeared to have a better head. Both plots were slightly attacked by the wheat midge and Atle appeared to suffer most. Progress ripened about five days the earlier. Both varieties were harvested on 30th August.

There was no disease or lodging at any centre.

The yields obtained from the plots are given in accompanying table. The yield of Progress was significantly greater at each of the three farms.

YIELD FROM PLOTS IN LB.

	ATHENRY		BALLYHAISE		CLONAKILTY	
	Atle	Progress	Atle	Progress	Atle	Progress
	50.5	58	37	35.5	56	74
	58.5	60	41	39	82	85
	59	67	46.5	47.5	75	84
	62	71	36.5	45.5	64	91
	62	76	34.5	37	59	85
	61	62	37	54	65	85
	51	68	36	50	56	92
	55.5	60	41.5	48	74	87
	59	63	39	48	63	90
	60	62	44.5	54.5	60	86
	58	61	46.5	58.5	59	69
	48	59	41.5	50	54	76
Means	57	63.9	40.1	47.3	63.9	83.7
Mean Differences ..		+6.9		+7.2		+19.8
S.E. of Mean Difference ..		1.49		1.75		2.74

t at P=0.01 and 11 degrees of freedom=3.106.

REPORT OF THE SEED PROPAGATION DIVISION, 1947

The work of the Seed Propagation Division for the past year comprised :—

1. The propagation and distribution of pedigree seed of barley, wheat, and oats.

2. The inspection of barley extension crops grown from such seed.

3. The maintenance of pure lines of various varieties of barley and linseed.

4. The breeding, selection and propagation of new varieties of barley.

5. The testing of barley varieties.

The barley work was done in collaboration with Messrs. A. Guinness, Son & Co. Ltd., at whose experimental maltings malting tests were made. The oat work was done in collaboration with the Plant Breeding Division of University College, Dublin, which provides the Department with nucleus stocks. Except where otherwise stated in the report, the work was done at the Department's Cereal Station, Ballinacurra, Co. Cork, and the cultivations and experiments were made on the farm of J. H. Bennett, Ltd., on which the Cereal Station is located.

METHOD OF PEDIGREE SEED PROPAGATION.

The following, as well as giving non-technical explanations of certain terms used in the report, gives an account of the method used in the production of pedigree seed of cereals.

Pure Line.—A pure line of a variety consists of a few hundred plants known to have descended with unaltered constitution from the original or foundation plant. Its produce provides material for its own maintenance and for the building up of larger stocks if such are required.

Garden Plot.—Usually ten to twenty times larger than the pure line, it is used as the first step in the extension of a pure line or for growing small quantities of other material such as the produce of a new cross or selections therefrom. As well as providing material for further propagation and for small scale trials, it acts as an observation plot in the case of new varieties,

aiding a decision on their merits. Pure lines and garden plots are usually sown by dibbling single seeds at regular spacing thus making possible the separate examination of each plant.

Field Plot.—This is the second step in building up of pure stocks from a pure line. It is seeded with the produce of a garden plot. Great care is taken to ensure the purity of its produce; it never follows another corn crop; frequent inspection is made during the growing season and threshing is done with a specially constructed, easily cleaned thresher.

First Pedigree Plot.—This is seeded with the produce of a field plot and is as carefully managed as the latter.

Second Pedigree Plots.—These, which are seeded with the produce of a first pedigree plot, bring the pedigree plot area of a variety up to about forty acres. The resources of the Cereal Station in non-stubble ground cannot meet this and farmers in the neighbourhood of Ballinacurra co-operate at this stage by growing the seed supplied them on clean ground and with care and isolation at every stage. They contract to grow, harvest and thresh the crop under the Department's supervision and to deliver the produce to the Cereal Station.

Only established varieties or those which have proved their value in trials are brought to the second pedigree stage. New varieties are dropped at any of the earlier stages of multiplication if they fail to pass the trials to which they are submitted at various stages.

In the case of Spratt-Archer barley special care, over and above that ordinarily employed, is taken to ensure the maintenance of a high standard of purity. Instead of a single pure line, twenty-five small pure lines are maintained which in extension give twenty-five small garden plots. In order to detect any possible deterioration in any of these pure lines, malting tests are made of each every third year at the garden plot stage. Further to this precaution the produce of the field plot and of the second pedigree plot are compared each year for yield and malting quality in a Half-Drill Strip experiment.

FURTHER EXTENSION AND DISTRIBUTION.

The produce of second pedigree plots and also of like pedigree stocks raised by the Plant Breeding Division of University College Dublin are distributed, through schemes operated by the Department, mainly to organisations who undertake to have them further increased and made

available to growers when suitable bulks are attained. These seed propagation crops are inspected by the County Instructors in Agriculture and officers of the Department in the case of barley and, in the case of other cereals, by qualified officers of the organizations concerned.

METHODS OF TESTING NEW VARIETIES.

As soon as a pound or so of seed of a new variety is available the variety can be tested in a small scale experiment. In this experiment each variety occupies a number of small plots—usually ten to fifteen. Experience has proved that with careful analysis of the data a valuable estimate can be made of the potential value of new selections.

When five or six stones of seed are available experiments on a field scale, such as Drill Strip or Half-Drill Strip experiments, can be undertaken. In these there are up to twenty or more plots of each variety under test, each the width, or half the width, of the corn drill and sixty to one hundred yards long. These experiments give very accurate information as to the relative merits of the varieties for the year and as to the location in which the experiments are conducted.

A variety emerging successfully from such trials, especially if tried on more than one occasion, merits inclusion in large scale experiments. These are conducted at various centres throughout the country, either directly by the Department or through the Instructors in Agriculture. A variety which proves its superiority in a series of large scale experiments is considered worthy of recommendation to growers and usually steps are taken to make pedigree seed of it available.

WEATHER.

Much rain fell during the first three weeks in January and a harsh easterly wind prevailed for the rest of that month. Considerable rain fell during a particularly sunless February, there being only 34.2 hours sunshine. The average temperature for February was 34.55 degrees F°. as compared with a normal mean of 46.2 degrees F°. During the month there was much frost and snow which prevailed until mid-March when a rapid thaw set in resulting in extensive flooding. There were only five rainless days during March and no less than 8.60 inches of rain were recorded between the 9th and 17th of that month. As a result of the very unfavourable weather, all spring work on the land was held up.

The first week of April was wet and windy and was followed by ten days of strong dry wind when a certain amount of cultivation was done. Strong

harsh wind prevailed towards the end of April and early May but during this time weather was "broken." Growth was retarded severely due to harshness of the wind and low temperature. During the second half of May temperatures were much higher and vigorous growth took place.

There were only six rainless days in June. Yet, in spite of exceptional lack of sunshine, temperatures were high and conditions excellent for development of corn, grass and roots.

The average rainfall for the period January to June, inclusive, was 33.61 inches as compared with 16.85 inches which is the average for this period since 1905 (taking of weather records at Ballinacurra began in 1905).

July was warm but even more sunless than June. The weather during the first three weeks was very broken. During the month growth was luxuriant but conditions for harvesting of hay were difficult.

A period of very good weather began on 5th August and lasted until the 10th September. In this period there was a heat wave which lasted three weeks, during which two hundred and thirty-one hours of sunshine were recorded in twenty-one days. Late hay was harvested in ideal weather but cereals suffered much from premature and too rapid ripening, although they were cut and saved under excellent conditions. Weather was broken during the middle of September but the beginning and end of the month provided excellent weather which continued for the first three weeks of a warm October.

The weather was broken during November and in the middle of the month there was a period of high temperature and high humidity, followed by a cold northerly spell.

The beginning of December was cold and wet but the middle of the month was fine and mild. The year ended with falling temperature and high humidity.

BARLEY CULTIVATIONS.

Crosses :

P.1. Kenia x E.1. Spratt Archer x D.S.K. Binder.
P.1. Kenia x F.1. Black Himalayan x Kenia.
F.1. Spratt-Archer x D.S.K. Binder.
F.1. Black Himalayan x Kenia.
F.2. H. deficiens 16 x Irish Archer x Kenia.
F.5. Spratt-Archer x Archer.
F.5. Spratt-Archer x Spratt.
F.5. Spratt x Archer.
F.5. Spratt-Archer x Kenia.

Selections :

64 selections from Spratt-Archer x Archer.
26 „ „ Spratt-Archer x Spratt.
31 „ „ Spratt x Archer.

Pure Lines :

Spratt-Archer 37 No. 3, Spratt-Archer 37 No. 4, Spratt-Archer 37/6, Spratt-Archer 37/6 No. 7, Spratt-Archer 37/6/3, Archer Goldthorpe 4/5/1, Spratt, Archer, Goldthorpe, Old Irish, Burton Malting, Victory, D.S.K. Binder, Plumage Archer, Plumage, Hybrid No. 7, Hybrid No. 5, Black Himalayan, Abed Kenia, Kenia, Goldthorpe Kenia 18/4, Naked Barley, Golden Archer 1, Golden Archer 2, Gold, Goldberg, Goldberg 2, Glabron, Pearl, Donegal 6 Rowed, July 6 Rowed, Beaven's F. 112, Beaven's 49/14/3, B.244, Spratt-Archer 37 No. 3H. 9 x Golden Archer 2. No. ½, *Hume's Archer 1, *Hume's Archer 2, Maja, Beaven's 54/12/3, Camton, Pioneer, Wong, Hordeum deficiens No. 16, Hordeum deficiens No. 16 x Irish Archer, Balder, Rigel.

Garden Plots :

Spratt-Archer x Archer 14.
Spratt-Archer x Archer 20.
Spratt-Archer x Kenia 22.
Spratt-Archer x Kenia 17.
Spratt x Archer 19.
Spratt x Archer 1.
Spratt-Archer x Spratt 2.
Spratt-Archer 37 No. 3.
Hume's Archer 1.
Hume's Archer 2.
D.S.K. Binder.
Kenia.
Freja.
Ymer.
Balder.
Rigel.
Camton.

Field Plots :

Spratt-Archer 37 No. 3.
Hume's Archer 1.
Hume's Archer 2.
Spratt-Archer x Archer 14.
Spratt-Archer x Archer 20.
Camton.

*Hitherto known as Spratt-Archer 37/9 x Golden Archer 2 No. 1 and Spratt-Archer 37/9 x Golden Archer 2 No. 2, respectively.

Field Plots—(continued)

Spratt-Archer x Kenia 17.
Spratt-Archer x Kenia 22.
D.S.K. Binder.
Kenia.

First Pedigree Plots :

Spratt-Archer 37 No. 3	4 acres.
Hume's Archer 1	1 acre.
D.S.K. Binder	2½ acres.
Kenia	1 acre.
Kenia x Spratt-Archer x Kenia 6/3 No. 5 ..	1 ,,

Second Pedigree Plots :

Grown under contract by farmers in the neighbourhood of Ballinacurra under the Department's supervision.

Spratt-Archer	41 acres.
Freja (Seed ex Sweden)	9 ,,
Ymer (Seed ex Sweden)	6 ,,

EXTENSION AND DISTRIBUTION OF PEDIGREE SEED BARLEY.

Under the scheme for the distribution of pedigree seed, 408 barrels of Spratt-Archer barley were distributed to the following members of the Irish Maltsters' Association who undertook to have the amounts they received further increased and made available to growers.

		Brls.
Messrs.	Minch, Norton & Co., Ltd., Athy	60
,,	Minch, Norton & Co., Ltd., Nenagh ..	25
,,	Minch, Norton & Co., Ltd., Muine Bheag	25
,,	Minch, Norton & Co., Ltd., Barracore ..	10
,,	Minch, Norton & Co., Ltd., Stradbally ..	30
,,	Minch, Norton & Co., Ltd., Rathangan ..	10
,,	P. O'Meara & Sons, Ltd., Thurles	10
,,	N. Hardy & Co., Ltd., Dundalk	10
,,	Cairnes, Ltd., Drogheda	10
,,	J. Bolger & Co., Ltd., Ferns, Wexford ..	10
,,	Beamish & Crawford, Ltd., Cork	5
,,	F. A. Waller & Co., Ltd., Banagher ..	12
,,	G. Read & Co., Ltd., Roscrea	15
,,	Joshua Watson & Co., Ltd., Carlow ..	45
,,	Joshua Watson & Co., Ltd., Leighlinbridge	15
,,	W. J. O'Keeffe & Son, Ltd., Wexford ..	10
,,	D. E. Williams, Ltd., Tullamore	37
,,	P. & H. Egan, Ltd., Tullamore	20

		Brls.
Messrs.	J. & A. Tarleton, Ltd., Tullamore	10
,,	P. J. Roche & Sons, Ltd., New Ross ..	10
,,	North Tipperary Maltings, Ltd., Nenagh ..	15
,,	A. J. M. Reeves, Athgarvan Maltings, Kildare	4
,,	R. Gibney & Co., Ltd., Portlaoighise ..	10
	Total ..	408

In addition to the above, 3 Brls. 5 Sts. D.S.K. Binder was sent to the Agricultural School, Athenry, Co. Galway, for further propagation.

INSPECTION OF BARLEY EXTENSION CROPS.

The 1947 extension crops of Spratt-Archer, the produce of seed issued from Ballinacurra in 1947 and in 1946, and some crops from the produce of earlier issues, now classed as commercial seed, were inspected before harvest by Instructors in Agriculture and by officers of the Department. Reports indicating the probable suitability of these crops for seed purposes were made available to those co-operating in the Seed Barley Distribution Scheme. The following table (Table I) contains a summary of the results of the inspections.

TABLE I.

Crops grown from	Acreage inspected	Acreage passed as suitable for seed	Acreage rejected	Proportion rejected
Seed ex Ballinacurra in 1947	592	545	47	7.9%
Produce of Seed ex Ballinacurra in 1946	3,104	2,458	646	20.8%
Commercial Seed	2,450	1,931	519	21.2%
TOTALS ..	6,146	4,934	1,212	

The reasons for the rejections were:

(*a*) Other barley crops being grown without adequate isolation in the same field as the seed crops.

(*b*) Presence of an undue proportion of noxious weeds, wheat or oats.

(*c*) Grain of inferior quality.

It is desirable that firms co-operating in this scheme should exercise care in the selection of growers. From the number of crops rejected it is apparent that some distributors did not take sufficient care in this respect.

BARLEY EXPERIMENTS.

Small Scale Barley Variety Experiment.

Seven new Cereal Station selections, the best of a larger number tested in 1946, and the standard variety, Spratt-Archer 37 No. 3, were sown in a series of randomised blocks containing in all fifteen plots of each variety.

The list of varieties and the results of the experiment are set out in Table II.

Statistical examination of the results showed that Spratt-Archer x Kenia 17, Spratt-Archer x Archer 20 and Spratt-Archer x Kenia 22 gave significantly (1 per cent. level) higher yields than the standard variety, Spratt-Archer 37 No. 3. It is noteworthy that Spratt-Archer x Kenia 17 also gave the best malting quality as indicated by highest extract and lowest grain nitrogen. This variety, which showed considerable promise also in the 1946 trial, has short straw and ripens early.

TABLE II.

Small Scale Barley Variety Experiment, 1947.

Average of Fifteen Plots.

Variety	No. of Plants	No. of Ears	Ear weight : grms.	Straw weight : grms.	Grain weight : grms.	Coefficient of migration per cent.	Nitrogen per cent. (on dry matter)	1,000 corn weight : grms.	Malt extract
Spratt-Archer x Kenia 17 ..	100.0	282.2	258.1	219.8	213.0*	45.0	1.77	37.2	119.0
Spratt-Archer x Archer 20 ..	99.7	249.5	230.5	259.5	212.0*	41.7	1.87	33.7	116.1
Spratt-Archer x Kenia 22 ..	97.7	245.3	241.1	241.5	210.0*	43.6	1.88	35.8	117.8
Spratt-Archer x Archer 14	99.1	239.3	235.6	257.7	202.0	41.1	1.88	33.6	115.7
Spratt x Archer 1	100.5	244.5	232.5	247.8	199.3	41.7	1.85	32.6	116.4
Spratt-Archer x Spratt 2 ..	97.0	249.4	230.1	241.8	195.0	41.6	1.78	32.8	116.4
Spratt-Archer 37 No. 3 ..	97.9	251.1	222.7	236.7	189.8	41.6	1.84	32.0	118.1
Spratt x Archer 19	95.0	236.1	217.5	243.9	183.8	40.0	1.82	32.8	112.8

*Significant (P=0.01).

HALF-DRILL STRIP EXPERIMENT.

In this experiment, which was devoted to a routine check on the purity of the Spratt-Archer stocks under propagation, the produce of the Field Plot was compared with that of the Second Pedigree Plots. Each generation occupied twenty-two plots, a plot being a strip eighty yards long and half the width of the corn drill. The result (Table III) was very satisfactory, there being no appreciable difference between the generations in any respect.

TABLE III.

Barley Half-Drill Strip Experiment, 1947.

SPRATT-ARCHER 37 No. 3

Field Plot		2nd Pedigree	
Plot	st lb.	Plot	st. lb.
1	2 1	2	2 1½
4	2 5	3	2 4
5	2 8	6	2 1½
8	2 2	7	2 2½
9	2 8	10	2 8
12	2 1½	11	2 5
13	2 8	14	2 5
16	2 4	15	2 8½
17	2 7½	18	2 7
20	2 2	19	2 8
21	2 2	22	2 1½
24	2 3½	23	2 1⅛
25	2 6½	26	2 2½
28	2 5½	27	2 2½
29	2 6½	30	2 4½
32	2 4	31	2 2½
33	2 5	34	2 1
36	2 2	35	2 4½
37	2 1½	38	2 1½
40	2 2	39	2 4
41	2 0½	42	2 2
44	2 0	43	2 0
Total ..	49 1		49 4
*Average Nitrogen per cent. ..	1.62		1.68
*Average Weight of 1,000 (grms.)	30.30		29.6
Extract	120.7		119.6

*On dry matter.

DRILL STRIP EXPERIMENT.

In this experiment each variety occupied twelve plots, each plot being a sixty-six yard strip the width of the corn drill. The varieties compared were Ymer, Freja and Kenia. These varieties are early and have short straw, resistant to lodging. Ymer and Freja are recent products of the Svalof Plant Breeding Institute, Sweden, from which country they were imported in 1947.

Kenia, an older variety, is of Danish origin. It was brought here in 1936 and tried in small scale experiments in 1940, 1941, 1943 and 1946. On these occasions it proved equal to or better than Spratt-Archer in yield but inferior to it in malting quality.

In the present experiment Freja was about four days earlier than Ymer or Kenia, and these in turn seven days earlier than comparable Spratt-Archer.

The results, which are set out in Table IV, show that both Ymer and Freja were significantly (1 per cent. level) superior to Kenia. All show poor malting quality, Ymer being particularly bad in this respect.

TABLE IV.

Drill Strip Experiment, 1947.

Block	Ymer st. lb.	Kenia st. lb.	Freja st. lb.
1	6 8	6 5	6 1
2	6 10	6 0	6 7
3	6 8	5 12	6 3
4	5 9	5 7	5 7
5	5 5	5 4	5 10
6	6 3	5 9	6 0
7	6 0	5 7	5 12
8	6 2	5 10	6 4
9	6 2	5 7	6 5
10	6 7	5 12	6 7
11	6 8	5 11	6 8
12	6 7	6 3	6 8
Totals ..	74 13	69 3	74 2
Barrels per acre	11.09	10.25	10.98
*Average Nitrogen per cent.	1.58	1.76	1.61
*Average weight of 1,000 Corns (grms.)	32.4	31.6	33.6
Extract	112.9	117.5	118.9

*On dry matter.

LARGE SCALE EXPERIMENT.

This experiment was devoted to a comparison of the varieties Spratt-Archer 37 No. 3, Hume's Archer 1, D.S.K. Binder, and Ymer. It was carried out at ten centres in seven counties, one in each of the counties Cork, Tipperary, Kilkenny, Kildare and Louth, two in Offaly and three in Wexford. At each centre each variety occupied one acre. Owing to unfavourable weather, sowings extended from 11th April to 12th May.

At all centres braird and early growth were satisfactory. Subsequent growth was poor at New Ross and, to a lesser degree, at the Enniscorthy, Kilmore and Goresbridge centres. At the Cork centre, severe "Take All" developed with approximately equal incidence in all the plots. At the Athy centre Spratt-Archer and Hume's Archer lodged badly, the other varieties standing well. At each of the other four centres subsequent growth and development were reasonably satisfactory.

Even taking into account these observed yield impediments the actual yields were very much below the promise shown by the various plots. They were, in fact, the worst yields ever recorded in the forty-four years during which this experiment has been conducted. That this was due to the failure properly to fill the grain is brought out clearly by the following comparison between the Spratt-Archer figures for 1947 and the average of the figures yielded by the same variety in these plots during the previous sixteen years.

Spratt-Archer	Yield	Bushel Weight	1,000 Corn Weight
	brl.	lb.	grm.
1947	6.07	49.97	27.8
Average 1931-1946	11.80	59.2	34.7

Particulars of the centres and of the results from them are set out in Tables V, VI and VII.

Ymer, a description of which has been given elsewhere in this report, was ready for harvest about a week earlier than the standard variety, Spratt-Archer. Its straw was at least a foot shorter than the latter. Where growth was poor it gave poor weed control and in some instances difficulty was experienced in harvesting it. In the one centre where lodging occurred it stood well. It gave the heaviest yield, twenty-eight stones per acre more than the standard. Although the nitrogen content of its grain was lower than that of any other variety in the trial it had the worst malting quality.

The quantity and quality of the nitrogen compounds in barley have considerable influence on the quality of the resulting malt. Generally speaking, malt from a low nitrogen barley has a higher extract, *i.e.*, more beer can be brewed from a barrel of it, and as between different samples of the same variety this rule is seldom broken. It is not a safe guide as between different varieties, and it has been found, for instance, that Ymer in this trial produces malt of lower extract than Spratt-Archer which had higher nitrogen.

D.S.K. Binder: About twenty years ago the Department obtained this barley from Denmark where it had been selected from an old native strain.

It is like Spratt-Archer in length and strength of straw but it is seven to ten days earlier ripening. In each of the years 1931, 1932 and 1933, in which it was tried in the large scale experiments it out yielded Spratt-Archer. Owing, however, to its relatively inferior malting quality it has not been included in these experiments since 1933.

In the present trial it has been re-introduced and has again proved its ability to out yield Spratt-Archer, being approximately equal to Ymer in this respect. Its grain, which was larger than that of the other varieties, had the highest nitrogen content yet its malting quality as predicted by the extract of its malt was better than that of any of the other varieties. Although it stood well in the one centre where Spratt-Archer lodged, it is not considered to have better standing straw than that variety.

Spratt-Archer 37 *No.* 3 : This variety, which was bred at the Department's Cereal Station, is too well known to need description. It is beyond doubt the best barley of its type in general cultivation.

Hume's Archer 1 : This is one of a number of selections from a cross made at the Cereal Station in 1936 between Spratt-Archer 37/9 and Golden Archer 2. It is very similar to Spratt-Archer 37 No. 3. This year it has proved equal to Spratt-Archer in practically every respect. In previous trials it had shown a like equality in malting quality accompanied by a slight superiority in yielding capacity.

TABLE V.

Large Scale Barley Variety Experiments, 1947.

Name and Address of Grower	Description of Soil	Previous Crops	Date of Sowing	Date of Harvesting*
Wm. Tait, Rostellan Co. Cork.	Medium loam, subsoil shale	1945—beet 1946—wheat	11th April	18th August 26th August
P. Byrne, Ballygrangans, Co. Wexford.	Sandy loam, subsoil gravel	1945—oats 1946—roots	12th May	2nd September 8th September
D. Morris, Tomahurra, Enniscorthy, Co. Wexford.	Shale loam, subsoil shale	1945—barley 1946—roots	2nd May	27th August 4th September
Mrs. Segrave, Dunany, Dunleer, Co. Louth.	Strong loam, subsoil gravel	1945—oats 1946—swedes	14th April	30th August 1st September
C. V. Dean-Drake, Stokestown, New Ross, Co. Wexford.	Deep loam, subsoil shale	1945—wheat 1946—swedes	14th April	27th August
M. P. Minch, Rockfield, Athy, Co. Kildare.	Deep loam, subsoil gravel	1945—grass 1946—grass	11th April	18th August 22nd August
W. Mullins, Duninga Ho., Goresbridge, Co. Kilkenny.	Strong loam, subsoil limestone	1945—beet 1946—wheat	27th April	20th August 24th August
D. O'Brien, Ballinmore, Tullamore, Offaly.	Gravelly loam, subsoil limestone	1945—grass 1946—rape	19th April	18th August 26th August
E. P. Ruttledge, Ballyeighan, Birr, Offaly.	Light loam, subsoil limestone	1945—wheat 1946—roots	15th April	25th August 30th August
M. Carroll, Belleen, Nenagh, Co. Tipperary.	Strong loam, subsoil limestone	1945—wheat 1946—beet	30th April	26th August 1st September

*The earlier date pertains to Ymer, and D.S.K. Binder.

TABLE VI.

Large Scale Barley Variety Experiments 1947; Yield and Value of Grain per Statute Acre.

	SPRATT-ARCHER 37 No. 3				HUME'S ARCHER 1				D.S.K. BINDER				YMER			
	Yield of		Value per barrel	Total value, including screenings	Yield of		Value per barrel	Total value, including screenings	Yield of		Value per barrel	Total value, including screenings	Yield of		Value per barrel	Total value, including screenings
	dressed grain	screenings			dressed grain	screenings			dressed grain	screenings			dressed grain	screenings		
	Brls. St.	St.	s. d.	£ s. d.	Brls. St.	St.	s. d.	£ s. d.	Brls. St	St.	s. d.	£ s. d.	Brls. St.	St.	s. d.	£ s. d.
Cork: Wm. Tait ...	5 5	3	40 3	10 15 4	6 4	3	40 2½	12 12 0	6 1	3	40 6	12 7 1	7 13	3½	40 2	15 15 7
Tipperary: M. Carroll ...	5 7	3½	40 8½	11 3 1	5 12	3½	40 9	11 16 1	8 8	4½	40 6½	17 6 10	7 13	4	40 2½	15 16 2
Offaly: E. P. Ruttledge	8 4	1½	40 11½	16 18 8	7 0	1½	41 0	14 7 9	6 12	1½	40 9	13 15 10	6 6	1	40 5	12 18 2
D. O'Brien ...	5 9	3½	40 8½	11 8 2	5 15	3	40 7½	12 2 9	7 0	1	40 5½	14 3 9	8 0	3	40 5	16 4 10
Kildare: M. P. Minch ..	5 6	11	39 6½	10 18 1	6 8	10	39 8	13 2 10	10 2	3	40 6½	20 12 0	11 12	3½	40 0½	23 12 3
Kilkenny: W. Mullins ...	3 6	5	40 4½	6 18 9	3 6	5½	40 3½	6 18 9	5 14	5	40 6	12 0 5	5 3	6	40 1½	10 11 2
Wexford: ... C. V. Dean-Drake	6 1	—	40 3½	12 14 3	6 3	—	40 3½	12 9 4	6 6	—	40 4½	12 17 5	6 15	—	40 2½	13 18 11
P. Byrne ...	4 6	2	40 1	8 16 4	5 5	3	40 8	10 15 4	6 3	3	40 6	12 12 1	6 5	3½	40 2	12 15 4
D. Morris ..	6 3	3	40 4½	12 11 4	4 9	3½	40 5½	9 6 4	6 2	3	40 6½	12 9 10	6 15	3	40 3½	14 1 0
Louth: Mrs. Segrave ...	10 12	4	40 9½	22 0 6	9 13	4	40 9½	20 2 4	11 14	5	40 7½	24 4 11	11 3	6	40 5½	22 15 8
Average ...	6 1.1	3.65	40 5	12 8 5½	6 1.1	3.7	40 5	12 7 4	7 7.8	2.9	40 6½	15 5 0	7 13.3	3.35	40 3	15 16 11

Screenings valued at 6d. per stone.

TABLE VII.

Large Scale Barley Variety Experiments 1947; Analysis of Produce.

GROWER	SPRATT-ARCHER 37 No. 3				HUME'S ARCHER No. 1				D.S.K. BINDER				YMER			
			On dry matter				On dry matter				On dry matter				On dry matter	
	Bushel weight	Moisture	wt. of 1,000 corns	nitrogen	Bushel weight	Moisture	wt. of 1,000 corns	nitrogen	Bushel weight	Moisture	wt. of 1,000 corns	nitrogen	Bushel weight	Moisture	wt. of 1,000 Corns	nitrogen
	lb.	%	grms.	%	lb.	%	grms.	%	lb.	%	grms.	%	lb.	%	grms.	%
Wm. Tait	48.9	18.0	25.0	1.40	48.6	18.2	25.2	1.48	52.3	17.1	29.5	1.46	48.6	16.8	27.8	1.42
M. Carroll	50.4	20.6	30.0	1.28	50.4	20.6	31.3	1.34	50.6	20.9	34.8	1.60	48.4	21.8	30.8	1.56
E. P. Ruttledge	54.0	18.2	32.0	1.44	53.2	18.6	31.6	1.42	55.8	15.2	34.0	1.44	52.6	15.6	30.6	1.40
D. O'Brien	53.0	16.4	27.6	1.46	52.8	15.4	27.2	1.42	55.6	15.7	32.0	1.54	53.6	15.2	30.6	1.46
M. P. Minch	46.0	15.4	22.6	2.24	47.4	15.2	21 6	2.04	54.0	16.2	33.4	1.88	50.0	15.4	28.5	1.84
Wm. Mullins	48.0	18.3	26.7	1.42	47.6	18.4	26.6	1.36	52 0	17.7	32.6	1.47	47.8	18.0	26.8	1.40
C. V. Dean-Drake ..	48.6	18.0	26.0	1.38	48.2	18.4	24.6	1.52	52.0	17.8	29.5	1.40	49.7	16.5	26.2	1.34
P. Byrne	47.6	21.4	23.2	1.32	48.2	20.2	24.4	1.29	51.1	19 6	30.5	1.24	48.1	19.6	26.8	1.24
D. Morris	49.1	18.4	28.4	1.42	48.9	18.6	27.6	1.42	51.3	18.0	31.4	1.46	48.5	18.2	28.9	1.46
Mrs. Segrave	54.1	17.6	31.5	1.45	53.8	17.7	31.4	1.42	54.0	18.6	35.8	1.54	52.0	18.4	30.8	1.45
Average	49.97	18.23	27.30	1.481	49.91	18.13	27.15	1.471	52.87	17.68	32.35	1.503	49.93	17.55	28.78	1.457
Malt Extract ..	124.6				125.8				126.2				122.5			

OATS.

Small Cultivations.

A pure line of Black Tartary and field plots of Sandy and Blantyre were grown at the Cereal Station.

Department's Extension Plots.

Victory II	33½ acres.
Glasnevin Triumph	30 ,,

These were seeded with the produce of nucleus stocks received from the Plant Breeding Division of University College Dublin, and were grown under contract by farmers in the neighbourhood of Ballinacurra under the supervision of the Department.

Distribution and Extension of Pedigree Seed.

Under the scheme for the distribution of pedigree seed 320 barrels of Victory II and 221 barrels of Glasnevin Triumph were distributed to the following on the condition that these stocks would be further increased and made available to growers.

	Victory II Brls.	*Glasnevin Triumph* Brls.
Messrs. Pedigree Seed Growers, Ltd., 151, Thomas Street, Dublin ..	294	215
Messrs. J. H. Bennett, Ltd., Ballinacurra, Co. Cork	20	—
The Superintendent, Agricultural School, Athenry, Co. Galway ..	2	2
The Superintendent, Agricultural School, Ballyhaise, Co. Cavan ..	2	2
The Superintendent, Agricultural School, Clonakilty, Co. Cork ..	2	2

The Plant Breeding Division, University College Dublin, co-operated with the Department in the working of the scheme and distributed stocks as follows:

		Brls.	St.
The Cereal Station, Ballinacurra, Co. Cork.	*Victory II* ..	10	0
,, ,, ,,	*Glasnevin Triumph*	15	0
Agricultural School, Athenry, Co. Galway.	*Potato* (*Ardee*) ..	9	4

WHEAT.

Field plots of Extra Kolben II and Red Marvel x Diamant 4 were grown at the Cereal Station.

Under the Pedigree Seed Distribution Scheme thirty-two barrels of April Red were allocated to Messrs. Pedigree Seed Growers, Ltd., 151, Thomas Street, Dublin, for further multiplication and distribution.

In co-operation with the scheme the Plant Breeding Division of University College Dublin distributed stocks as follows :

		Brl.	St.
Messrs. Pedigree Seed Growers, Ltd., 151, Thomas Street, Dublin.	*Pajbjerg* ..	147	10
,, ,, ,, ,,	*Atle*	85	0

LINSEED.

Garden plots of the following varieties were grown at the Cereal Station : Redwing, Bison, Buda, Newlands, Argentine Linseed, Rio, Boley Golden, Concurrent.

KERRY CATTLE

The day of the fancy breeds of cattle would appear to be past. This fact need not seriously concern breeders of Kerry cattle, for while the attractive appearance of the Kerry has made her a favourite with those who regard cattle breeding as a hobby rather than as a business, the Kerry cow has solid claims to be considered primarily as a commercial animal, *e.g.*,

1. Comparative freedom from tuberculosis.
2. Hardy constitution and ability to stand exposure.
3. Longevity
4. Economy in feeding.
5. High percentage of butter fat in the milk.
6. Good average milk yields.
7. Special suitability of the milk for children and invalids.
8. Suitability as store cattle on all classes of land, poor as well as rich.
9. High class of beef and handy size to meet modern demand for small joints.

As with other breeds of cattle in these islands it is difficult to trace with any certainty the origin and early history of the Kerry—the only existing native breed of Irish cattle. The various theories advanced in this connection are for the most part merely speculative, as no systematic records were kept up to the time when the Irish Herd Book was instituted by *The Farmers' Gazette* at the suggestion of The O'Mahony, of Kilmorna, County Kerry, where he had founded the famous Kilmorna Herd.

There is sufficient data to establish the fact that Kerry cattle, as a distinct breed, existed in Ireland from a very remote period in the history of the country, and that the cows, for their size, were always remarkably good milkers. In a very interesting paper by Prof. James Wilson, published in the scientific proceedings of the Royal Dublin Society, the conclusion arrived at, after a very exhaustive investigation, is that "the Kerries are all that are now left of the races that at one time inhabited the whole island, but which have been gradually pushed out by imported cattle." It is only in the mountainous districts of the County Kerry and on the Berehaven Peninsula in County Cork (known as the Kerry Cattle Area) that the breed is now to be found as the commercial cattle reared and kept on practically all the holdings. Herds of pedigree stock exist in other parts of Ireland, Great Britain, and in some other countries, but these are later creations and their history can be traced. There is a general consensus of opinion that the native Irish cattle were originally all black in colour, the same, indeed, as the native Celtic cattle of Great Britain, which are still to be seen in the Black Welsh cattle, and which inhabited these islands before the introduction of the Anglo-Saxon red cattle and the white cattle brought over at the time of the Roman invasion.

Although the Kerry Herd Book was not initiated until the year 1887, classes were provided for Kerry cattle at the Royal Dublin Society's Spring Show as early as 1884.

The Farmers' Gazette published the first volume of their "Register of Pure-bred Kerry Cattle" in 1887, and after the issue of three volumes it was taken over by the Royal Dublin Society, who published Volume I of the existing Irish Herd Book in 1890. This volume contained the entry of 118 Kerry bulls and 948 Kerry cows. All animals entered in the first, second and third issues of the Kerry Register, as published by *The Farmers' Gazette*, were accepted as the basis of the Herd Book. The number given to each animal in the Register was adopted as the Herd Book number of that animal.

The Royal Dublin Society carried out a series of inspections annually to qualify foundation stock up to the year 1900, when, at the request of breeders generally, the Herd Book was closed to bulls other than pedigree animals and those with a certain number of crosses of sires already entered in the Herd Book. For the same reason no female animals could be entered for inspection after 1904, when the Herd Book was closed finally to all animals other than those with pedigree qualifications. The total entries in the Herd Book at the end of 1946 were 2,625 Kerry bulls and 7,687 Kerry cows.

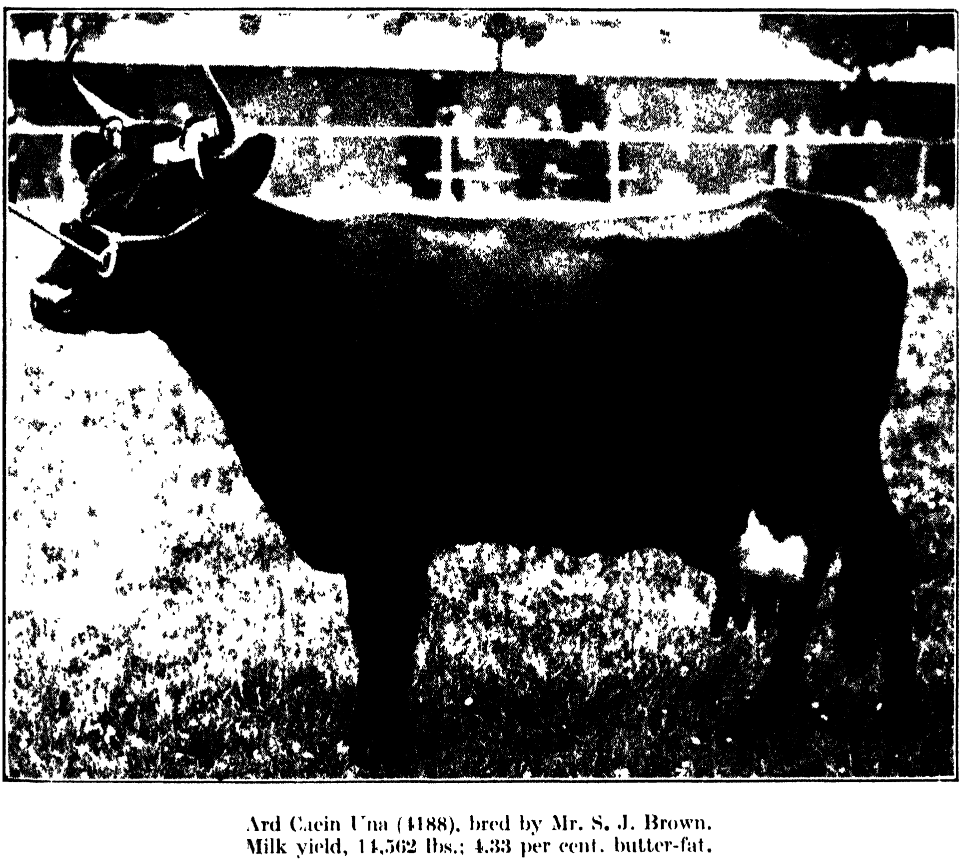
The following is the standard description of Kerry breed approved by the Kerry Cattle Society of Ireland, the Royal Dublin Society, and the British Kerry Cattle Society :—

COW.—The cow should be long, level and deep with sloping shoulder and fine chine, colour black, but a small amount of white on or immediately in front of the udder is permissible, her head long, fine and clean cut, eyes large and prominent, her horns fine with upward tendency, mottled or white tipped with black, her bone fine, her coat should be soft and skin pliable, her udder should be soft and large but not fleshy, extending well forward; the teats being placed square and well apart, the milk veins prominent and large; the tail should be long and well put on, a few white hairs are permissible in the tassel but the flag should not have a white appearance. The Kerry cow usually weighs between 900 and 1,000 lbs. when in breeding condition.

BULL.—The bull should have the leading characteristics of the breed as described in the female but should show a fine masculine appearance with a gay and active carriage. His colour should be black, but a small amount of white on or immediately in front of the scrotum is permissible in animals of exceptional merit; a few white hairs are permissible in the tassel but the flag should not have a white appearance.

The Kerry breed is able to adapt itself to all degrees of climatic conditions such as prevail in different parts of England and Scotland, and also in other

Duv Alice (4106), bred by Mr. J. O'Neill, the property of the Earl of Dunraven.
Milk yield 9,681 lbs.



Ard Caein Una (4188), bred by Mr. S. J. Brown.
Milk yield, 14,562 lbs.; 4.33 per cent. butter-fat.

countries such as the United States of America, the Argentine, South Africa, and Australia. This is probably due to the outdoor treatment the animals receive at home, which is responsible for their robust constitution and freedom from disease. It has been truly said that the Kerry has few equals and no superiors as regards robustness and hardiness of constitution. She has been called "the poor man's cow," the cow that does well upon poor fare and gives an excellent return for generous feeding. The Kerry has stood the test of time and to-day stands out as eminently suitable to produce milk, butter, cheese and beef at the lowest possible cost for food consumed. The cost of her maintenance is low, as she requires little, if anything, beyond what nature provides in the fields. She may therefore be termed a really economic cow.

As a store and beef animal the Kerry compares favourably with any other breed. It has a medium-sized frame and keeps in nice condition even on the poorest herbage. When transferred from its native hills in Kerry to richer pastures it puts on weight rapidly and the finished animal is very much sought after. The well-marbled flesh of the Kerry and its crosses is all that can be desired, and even among the most fastidious, Kerry veal is a delicacy that is much appreciated. There is always a demand for the nice small joints where small families are concerned, and in this respect the Kerry certainly holds a primary position in the food production of the country. Apart from the intrinsic merits of the breed as dual purpose stock, they are an ornament to any farm or demesne.

Milk Records and Registration.

It is now generally admitted that the only reliable way of demonstrating the milking capacities of any breed of cattle is the adoption of a system of milk records carried out under proper supervision. In this connection the Department of Agriculture, Dublin, has in operation two Schemes, *viz.*, (1) the Scheme for the Registration of Pure-Bred Dairy Cattle (No. 20A) and (2) the Scheme for the Registration of Non-Pedigree Dairy Cattle (No. 20). Cows which are found to be of good conformation and colour, and of well-defined type are accepted for entry in the Department's Register of Dairy Cattle, provided they reach the standard required as to quantity and quality of milk yield. For cows of the Kerry breed, the qualifying standard is at present 5,000 lb. milk and 175 lb. butter-fat, the average of the butter-fat tests being not less than 3 per cent. A similar Scheme is in operation under the Ministry of Agriculture for Northern Ireland.

Milk records which have been authenticated by the Department of Agriculture (Dublin) and the Ministry of Agriculture (Northern Ireland) are given in the Kerry Herd Book published by the Royal Dublin Society. An Appendix to the Herd Book contains a Register for the following classes of Kerry Cattle :—

Class A. Cows accepted for registration by the Department of Agriculture (Dublin) or the Ministry of Agriculture (Northern Ireland).

Class B. Female progeny of cows accepted for Class A got by a bull entered in the Kerry Herd Book.

Class C. Female progeny of cows accepted for Class B got by a bull entered in the Kerry Herd Book.

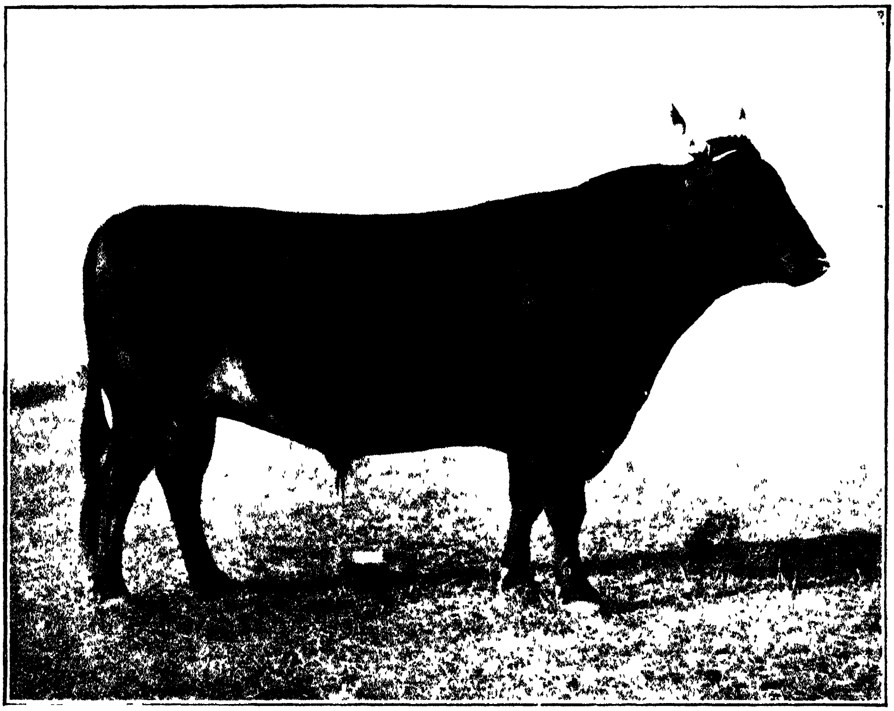
Classes A and B are probationary classes and do not entitle the animals to regular and complete entry in the Herd Book. Class C includes animals which are eligible for complete entry in the Herd Book.

NOTE.—Animals for Classes B and C are accepted only after registration by the Department of Agriculture (Dublin) or the Ministry of Agriculture (Northern Ireland).

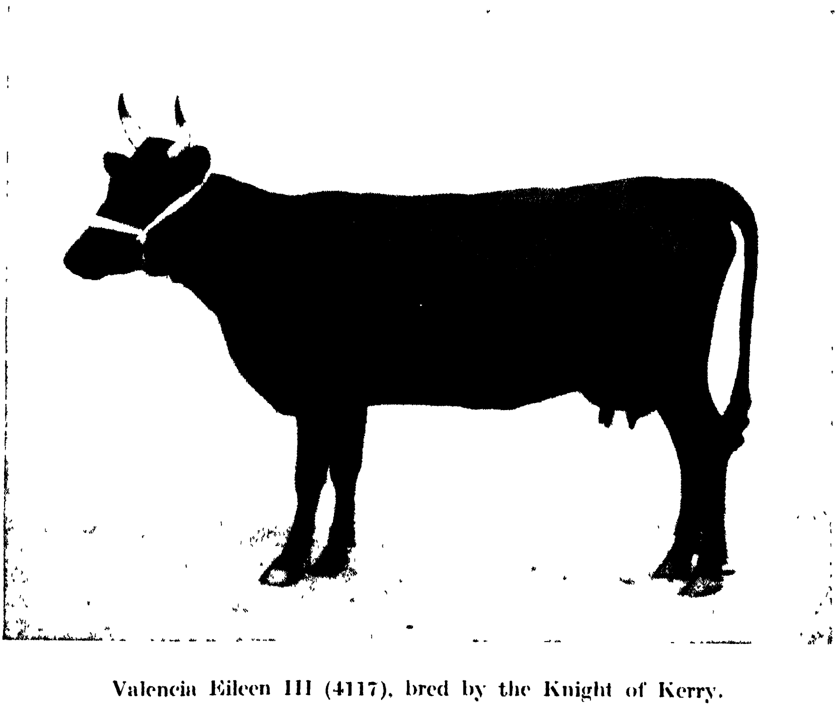
An analysis of the figures of yields reveals many interesting facts and shows that there exists in Ireland a valuable pure breed of native dairy cattle. In considering this statement it must be borne in mind that the yields quoted were produced, as a rule, on moderate fare; in most herds the cows were fed on roots and hay in winter and on pasture only during the summer months, but since they are naturally a hardy breed they thrive well in the open. The first forty-five weeks after calving constitutes the milking period. This is regarded as the most equitable term and is now being adopted in Great Britain and in the United States of America.

Of the capabilities of the Kerry as a producer, striking evidence is afforded by the subjoined particulars of the yields of a number of cows already tested under the Scheme :—

Name of Cow	Milk Yield lbs.	Period of Lactation Weeks	Average Butter-fat Yield %
Delphinium 20 of Carton (3704)	10,500	45	5.29
Muckross Kit (4363)	10,584	45	4.47
Bauncluone Teresina (5924) ..	10,584	45	4.48
Ard Caein Buttercup (4757) ..	10,593	45	4.01
Eva of Carton (4298)	11,056	48	3.84
Gort Curley 4 (3877)	11,161	45	3.85
Darkie of Carton (4217) ..	11,269	45	3.83
Valencia Pailfil (4211)	12,124	40	3.46
Ard Caein Una (4188)	14,562	45	4.38



Valencia Chieftain (806), bred by the Knight of Kerry.



Valencia Eileen III (4117), bred by the Knight of Kerry.

The high average butter-fat test of the breed may be seen from the records published in the Kerry Herd Book kept by the Royal Dublin Society. Of 252 records so published in Volume 39 of the Herd Book the average butter-fat content in the milk was 5 per cent. and over in 10 cases, and between 4 and 5 per cent. in 156 cases. In the remaining 86 cases the average ranged from 3.18 to 3.98 per cent. Of these records 162 were kept under the supervision of the Department of Agriculture (Dublin) and 90 under that of the Ministry of Agriculture for Northern Ireland.

Taken as a whole, the yields are excellent for a small breed, and since the general experience is that the food required to support two cows of any of the larger breeds will easily maintain three Kerry cows, the yields of the Kerry breed will compare very favourably with the yields of the larger cattle. For example, three Kerry cows, each yielding 6,000 lbs. of milk, give a total of 18,000 lbs. To equal this production two larger cows should give 9,000 lbs. each—a milk yield which is by no means common and not easy to attain. Further, in view of the fact that in the case of the Kerry breed the percentages of butterfat are considerably higher than in the case of the larger breeds, it must be conceded that the Kerry cow is a very valuable and economical animal worthy of much more attention than has been given to it in the past.

As the globules of butter-fat in the milk are smaller than in milk of other breeds, the cream does not rise so quickly and, therefore, is better for use as new milk, and also makes singularly sweet butter.

Certificates of Merit.

Certificates of Merit are now issued by the Kerry Cattle Society in respect of cows or heifers attaining the following standard as certified by the Department of Agriculture :—

A.—Heifers not exceeding 3½ years at commencement of lactation.

Standard.—250 lbs. butterfat, provided milk yield does not fall below 6,000 lbs. in 45 weeks, or butter-fat average below 4.0 per cent.

B.—Cows not exceeding 4½ years at commencement of lactation.

Standard.—300 lbs. butter-fat, provided milk yield does not fall below 7,000 lbs. in 45 weeks, or butter-fat average below 4.0 per cent.

C.—Cows over 4½ years at commencement of lactation.

Standard.—300 lbs. butter-fat, provided milk yield does not fall below 8,000 lbs. in 45 weeks or butter-fat average below 4.0 per cent.

General.

One of the most useful characteristics of the Kerry breed is its freedom from tuberculosis, which makes the Kerry particularly valuable in cases where cows are kept for supplying milk to families and institutions. Professor Lionel James Picton, M.A., M.B., the Medical Officer of Health, Winsford, Cheshire, says :—"There can be no question as to the quality of the milk and freeness of the Kerry breed from tubercular troubles." The pedigree Kerry with the Wild White Ox of England are suggested by him for the breeding of a large type of tubercular immune cattle. The milk of the Kerry contains fine fat globules and Professor Picton refers in his writings to the finer cream emulsion as compared with the milk of other breeds. This is a valuable testimonial and endorsement of the worth of the Kerry cow.

Taking into account their many good qualities—in some respects peculiar to themselves—it is not surprising that the Kerries should have secured such wide popularity. Bred for centuries almost exclusively in the mountainous districts of the county from which they take their name, they have acquired constitutional characteristics unknown in most other breeds. They continue breeding regularly and milking well up to an age unusual in most other breeds, Kerry cows of even 20 years old being nothing very remarkable. Their power of enduring with indifference the most severe weather conditions has now grown proverbial; and their struggle for existence on the bleak, unsheltered slopes of their mountain homes, where vegetation is of the coarsest description, has inured them to the necessity of subsisting on the most scanty fare. For farms and districts where the land is so poor as not to yield pasture sufficient to carry other stock, the active Kerry has been found most suitable. With farm labourers and villa cow-keepers the Kerry has become exceedingly popular. Though generally allowed an unrestricted range on its native hills and naturally of a roving disposition, it bears confinement extremely well, and suffers little through being transferred to the limited area of the cottage plot or lawn. Docile at all times, it responds readily to generous treatment and gives more than adequate return in both milk and beef for the food it consumes. Its very appearance gives every indication of deep milking capacity. The experienced dairyman at once recognizes in the orthodox, wide-shaped outline of body—embracing all the good qualities of the dairy cow—an animal which promises to give every satisfaction at the pail.

To increase the supply of milk and bring it within the reach of all at a reasonable price, we must look to the development of the dairy breeds which we already have in these countries. The desired improvement can be effected only by testing the cows for yield and quality of milk, selecting the best, and mating them with bulls of their own type, having good milk records in their ancestry. To be of real value, milk records of the whole herd must be kept year after year, so that the cows which give a constant high yield may be

identified and their progeny retained for breeding purposes. Every year sees a steady advance in this direction.

The Kerry Cattle Society of Ireland.

At the instigation of a number of breeders and others interested in Kerry and Dexter cattle, a meeting was called in Killarney, on 14th July, 1917, at which it was decided to form an Association to promote the interests of Kerry and Dexter cattle breeding in Ireland.

It was agreed that the objects of the Society should be as follows :—

(1) To maintain the purity and promote the breeding of Kerry and Dexter cattle in Ireland.

(2) To collect, verify and publish information regarding the capabilities of these native breeds of cattle.

(3) To confer with the Department of Agriculture and the Royal Dublin Society in regard to matters relating to the breeds.

(4) To do all such things as may be considered advisable by the Society to encourage the breeding of Kerry and Dexter cattle in Ireland and promote the interests of owners and breeders.

At the annual general meeting of the Society held in June, 1919, it was decided to change the name to

"The Kerry Cattle Society of Ireland."

This alteration was deemed advisable as herds of pedigree Dexter cattle have practically ceased to exist in Ireland owing to the difficulty of breeding these cattle pure. It is the experience of Irish breeders that when Dexter cows are mated with a Dexter bull a large proportion of the progeny are either still-born or deformed, being such as are commonly called monstrosities. As a result of constant disappointments owners have gradually given up the attempt at breeding pedigree Dexters and so far as Irish breeders are concerned their whole attention is now directed to the development of the Kerry breed of which there are now many excellent herds in Ireland.

The Department of Agriculture gives special encouragement to the development of the Kerry breed in the Kerry Cattle Area and, in order to assist farmers in securing suitable animals, locates in the district each year a number of high-class pedigree bulls having good milk records in their ancestry. These

bulls are sold to selected applicants—farmers of small valuation—at the specially reduced price of £6, payable in three annual instalments of £2 each, on condition that the animals are available for the service of cows in the district at a reasonable fee.

The demand for bulls of the Kerry type declined during the war years, but has greatly increased since 1945. In the year 1947, 20 pedigree bulls of this type were supplied to selected applicants on reduced terms.

METHODS OF PLANT PROPAGATION IN THE GARDEN

The natural method of plant propagation is by seed. This method cannot always be adopted by the gardener because of the fact that many plants do not produce seed freely, others do not breed true to type, and yet others reach maturity so slowly from seed that the method would be uneconomic and unsatisfactory.

Vegetative propagation is the term applied to methods of plant propagation other than by seed and includes :—(1) Division, (2) Layers, (3) Offsets, (4) Cuttings, (5) Grafting and Budding.

1. PROPAGATION BY MEANS OF DIVISION.

Propagation by division is one of the simplest methods of plant increase, and can be applied readily to the majority of herbaceous perennial plants such as Iris, Delphinium, Michaelmas Daisy, Dahlia, etc.; to many shrubs such as Kerria, and certain Spiraeas and Hypericums; to fruits such as Raspberries which produce suckers freely; and to vegetables such as Rhubarb which do not normally come true from seed. The operation is best done in spring when growth is being resumed, although for many hardy plants division in autumn suits quite well.

Normally those plants which are suitable for division produce sufficient material for propagation purposes and all that is required is to lift the parent plant or a portion of it during the autumn or spring and split it with a spade, trowel, or knife into several new plants. (Figs. 1 and 2).

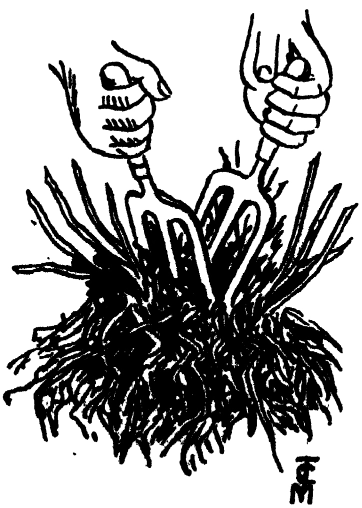


Fig. 1. Propagating an herbaceous perennial by splitting the clump.

Fig. 2. Propagation of Delphinium by severing a rooted portion

If it is not desired to disturb the parent plant, it may often be possible to select and sever a number of suitably rooted portions from the outside of the clump (Fig. 3). Such outer portions are usually more vigorous and suitable for growth than those produced in the centre.

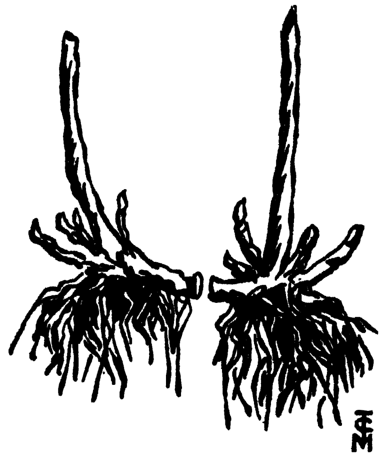


Fig. 3. Propagation of Michaelmas Daisy by severing vigorous portions from the outer edge of the clump.

Varieties of Dahlia can, if necessary, be propagated by division. The roots to be so treated are placed in gentle warmth in spring in a shed, glass frame or greenhouse. Then when shoots develop they are cut off with portion of the main root attached and transplanted out of doors when danger from frost damage has disappeared. (Fig 4).

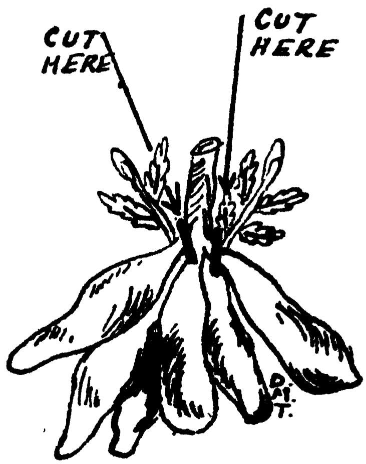


Fig. 4. Propagation of Dahlia by division in Spring.

An important variation of the methods of plant propagation already described is the formation of "Stool Beds." In this case shoots are formed, or are encouraged to form, near ground level and are moulded up or partially covered with soil during the summer months. When rooting has occurred the soil is removed carefully and the plants transplanted in the ordinary way.

Varieties of Heather and many similar plants can be propagated in this way by shaking sandy soil among the young growths during summer and severing the rooted shoots later.

In the commercial production of stocks for Apple and Pear propagation the parent rootstocks are planted about twelve inches apart in rows about four feet apart. After growing for a season the plants are cut back in early spring to within an inch of the ground. From two to six shoots will then develop from dormant buds, and as soon as these have grown a few inches they are moulded up with fine friable soil from the alley-ways. Further mouldings are made at intervals during the summer.

In winter when the leaves have fallen the soil is forked back, the rooted stocks exposed and severed with a sharp knife or secateurs. The parent stools are left exposed until shoots are produced in spring when earthing up is repeated as before and the process continued annually for as long as the stool bed remains productive. (Fig. 5).

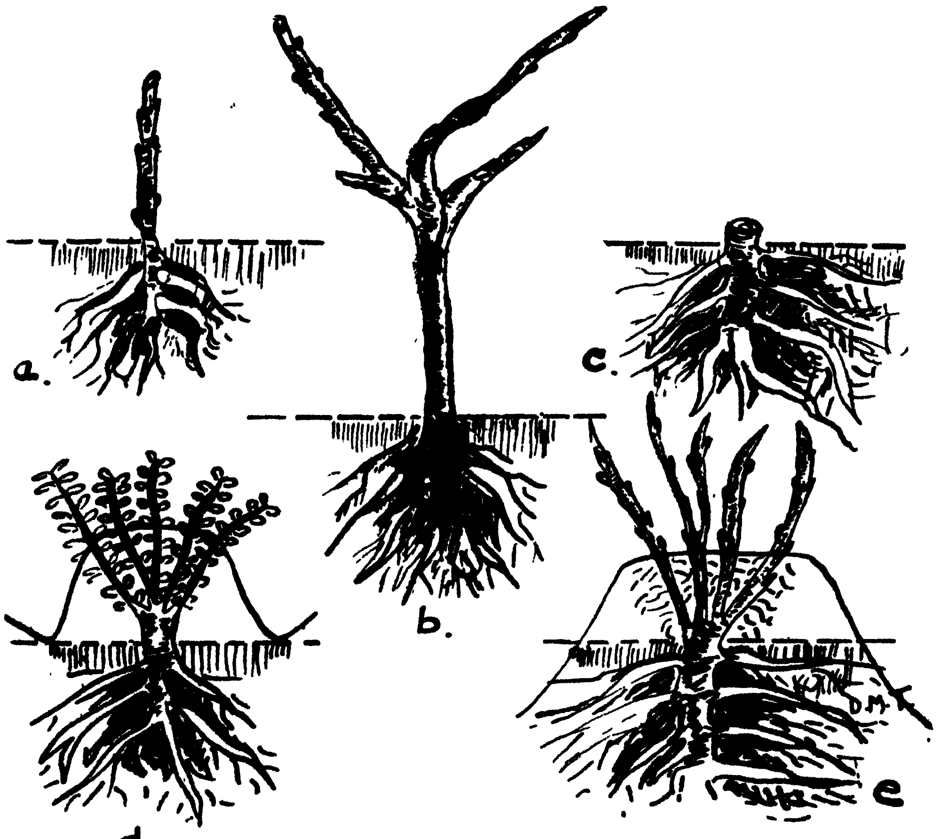


Fig. 5. Formation of a Stool Bed for fruit tree stocks.

a. Parent stocks are planted twelve inches apart in rows about four feet apart.
b. Stock after a year's growth.
c. Stock cut back at the end of the first year.
d. Shoots produced from the stock earthed up in early summer.
e. Rooted shoots ready for removal in winter.

2. PROPAGATION BY MEANS OF LAYERING.

LAYERING is one of the easiest and surest methods of plant propagation. It occurs naturally in woodlands and shrubberies where branches of blackberries, shrubs, and trees often come in contact with the ground and root naturally. In practice it is applicable to plants such as Strawberry, Loganberry, Carnation, Heath, Rhododendron, Lilac, etc., and, indeed, to any plant which is difficult to root with certainty by other means. The operation is usually done in September and October or in March.

Layering consists in bending or pegging down to the soil a shoot or branch after adopting some means of checking the flow of sap (such as removing portion of the bark) to encourage root formation. The layered branch is covered with soil or compost of a sandy nature which is kept watered. (Figs. 6, 7 and 8).

Large branches or thick stems should not be selected for layering.

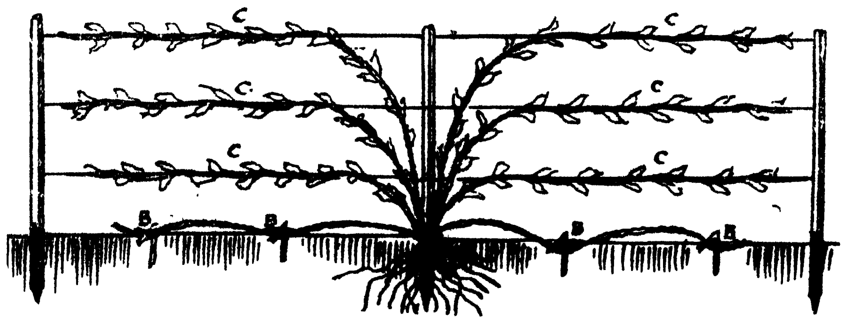


Fig. 6. Propagation of Loganberry by layering and pegging down young shoots. If a small number of new plants is required the tips of the shoots may be used as layers and the remainder of the cane tied up for fruiting when the rooted layer is removed.

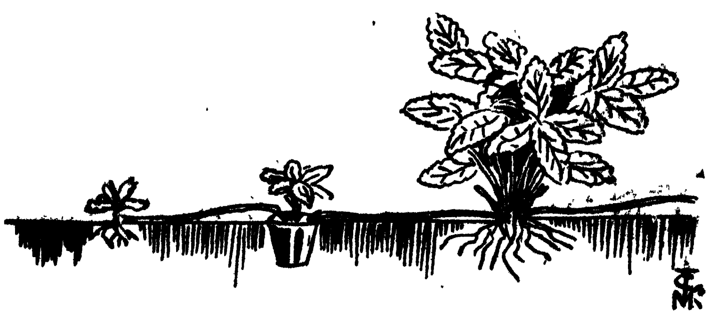


Fig. 7. Layering of Strawberry Runners. Runners required to produce plants for forcing purposes may be pegged into small pots.

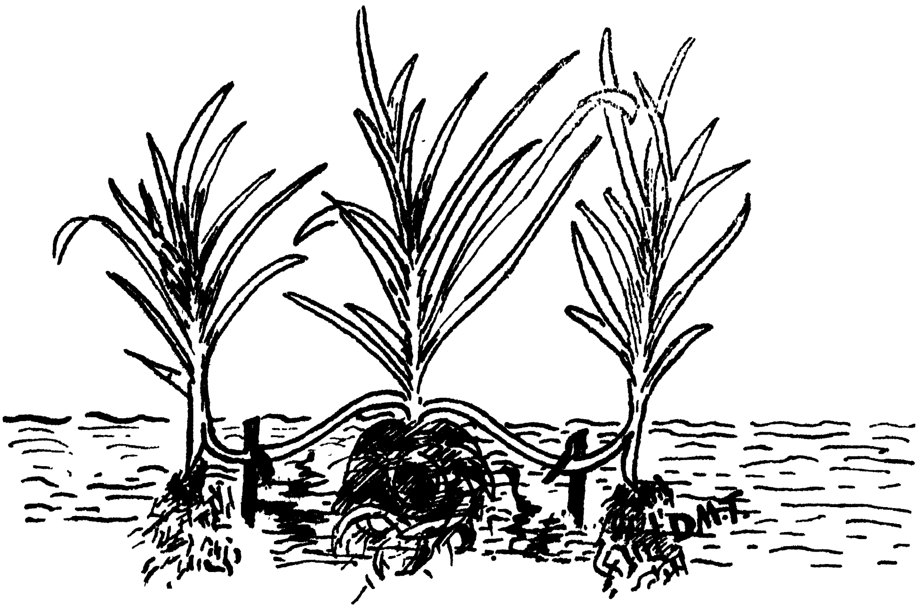


Fig. 8. Carnation shoots prepared for layering. Sap restriction and easy rooting are ensured by notching the shoot as shown.

3. PROPAGATION BY OFFSETS.

The Daffodil, Snowdrop, Garlic, Leucojum and Crinum are examples of plants which increase vegatively by means of "offsets" or small bulbs produced beside the parent. These if detached and replanted at the proper time will grow on to flowering size.

The scales which compose the bulbs of certain Liliums may be used to increase the stock, and so also may the aerial bulbs produced at the bases of the leaves above ground.

Corms differ from true bulbs in that they do not consist entirely of scales but are composed of a solid fleshy mass surrounded by a few membranous coats. Examples of plants reproducing by offset corms are Gladiolus, Crocus, Montbretia, and Ixia. The daughter corms are produced beside, or on top of, the parent and are planted in autumn or spring to grow on in the same way as bulbs. (Fig. 9).

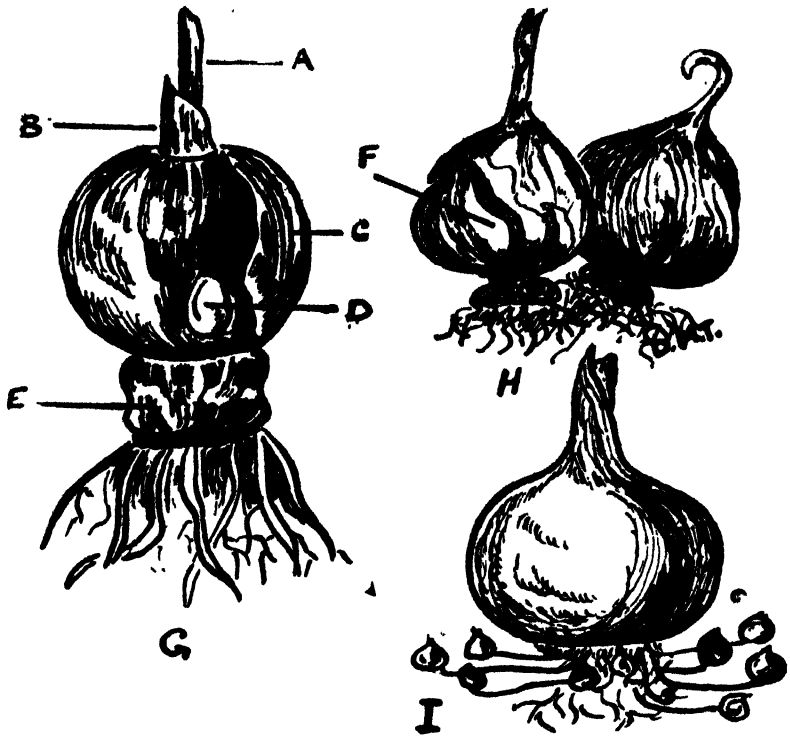


Fig. 9

A. Flowering stem.
B. Bud.
C. Next year's corm.
D. New Corm.
E. Last year's corm.
Crocus Corm. (G).

H. Garlic bulb showing offset at F.

I. Gladiolus corm showing method of increase by offsets.

As a general rule the sooner bulbs are planted after ripening the better. Although they will keep for a time in storage they do not improve and lose condition and vitality quite rapidly.

Spring flowering bulbs and corms should be planted in autumn, and summer flowering types such as Gladiolus, Montbretia, etc., in spring. The latter types should be carefully stored during winter in a dry frost-proof shed.

The soil in which bulbs and corms are planted should be open-textured and free from stagnant water. They thrive best in an open, loamy soil inclining to sand.

The depth at which to plant varies according to the kind, but generally the larger the bulb the deeper it should be planted. Fully developed Daffodil and similar bulbs are planted about four inches deep, smaller bulbs and corms at a lesser depth. (Fig. 10).

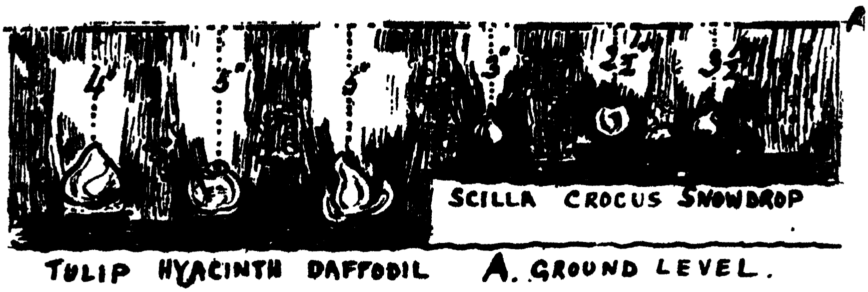


Fig. 10.

The treatment of bulbs and corms after flowering is very important as the next year's stores are then being built up. The bulbs should be left till all the leaves have died down before lifting takes place.

If it is necessary to remove bulbs before ripening they should be lifted with a spade and transplanted carefully, without disturbance or damage to foliage, into a shallow trench in a shady spot.

4. PROPAGATION BY MEANS OF CUTTINGS.

Many plants may be propagated by means of cuttings or "slips" which, though generally taken to mean a portion of a shoot, may in practice be any part of the plant such as root, stem, leaf or bud. These "slips," under suitable conditions, will develop roots and form a new plant.

SHOOT CUTTINGS : Shoot cuttings are of two types, (*a*) Soft or herbaceous, and (*b*) hard or woody. The former often require the protection of a shaded glass frame in their early stages of growth and careful attention until established. They may be inserted at almost any season of the year provided that the parent plant produces suitable material. Considerable judgment based on practical experience of the particular plant is required in selecting suitable shoots to form soft cuttings. They should consist of non-flowering growths cut off immediately below a joint (or node) and prepared further by removing the lower leaves with a sharp knife.

Care should be taken to prevent such cuttings from shrivelling or wilting and they should be inserted immediately in pots or boxes, or directly in lines in a frame containing a thick layer of clean sharp sand or a mixture of sand, peat, and sterilised soil. The cuttings should be inserted firmly and the frame kept closed and shaded until rooting occurs.

Examples of plants which may be propagated by soft cuttings are Chrysanthemum, Geranium (Zonal Pelargonium), Fuchsia, Calceolaria, Pentstemon, Pansy, Viola, etc., and a large number of shrubs. (Fig. 11).

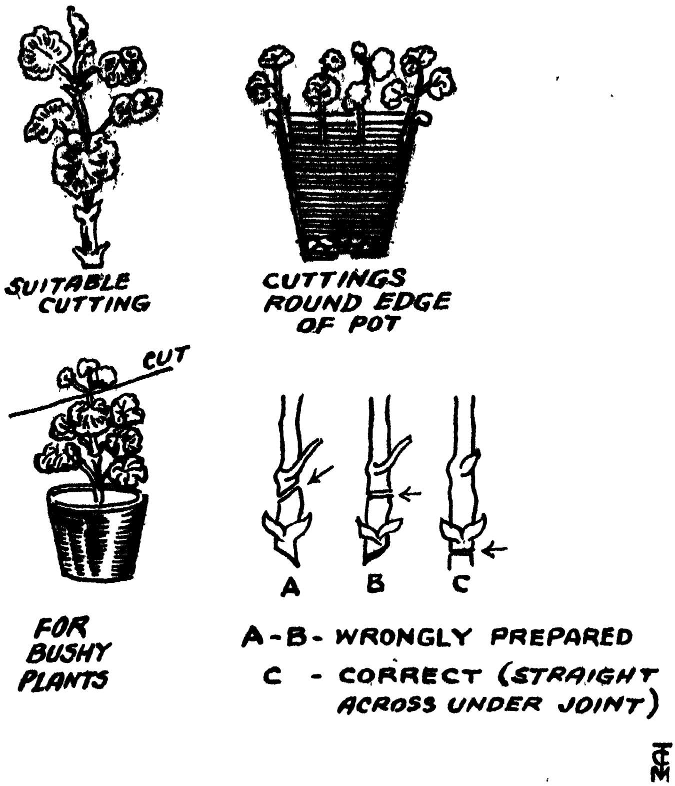


Fig. 11. Preparation and insertion of soft wood cuttings.

HARD WOOD CUTTINGS are selected during autumn and early winter and consist of well ripened shoots of the current season's growth from eight to ten inches long, and, if necessary, having a "heel" or portion of the previous year's wood attached. These shoots are inserted firmly out-of-doors about four inches apart in lines twelve inches apart and covered to about three-quarters of their depth. Application of sand to the base of the cuttings when inserted and before covering with soil will often assist rooting. After about a year the cuttings should have developed sufficient roots to enable transplanting to be done. Amongst examples of shrubs which may be propagated by hard wood cuttings are Flowering Currant, Poplar, Dogwood, etc., and of fruit trees, Gooseberry, Red Currant and Black Currant.

In the case of the Gooseberry and Red Currant, young shoots from eight to twelve inches long produced during the summer are selected in autumn. They may be cut off with a "heel" or portion of the old wood attached, thus ensuring successful rooting, or, if preferred, they may be cut off horizontally immediately below a bud. In either case the weak tip of the shoot is removed and also the lower buds, leaving only the four uppermost ones. The cutting is then ready for insertion. The bed for these cuttings should be rich and in an open position. No fresh manure should be added when preparing it but a

dressing of well decayed manure or leafmould may be given. To insert the cuttings, a line is put down and a vertical face about six inches deep is cut with the spade. At the bottom of this shallow trench some sand is sprinkled. Peat, if available, should also be added as it forms an excellent rooting medium for most cuttings. The cuttings are arranged upright four inches apart along the vertical face with their bases pressed well into the sand. The soil is then packed firmly around them. The lines of cuttings should be not less than one foot apart to allow for surface cultivation between them.

At the end of the first season's growth the young plants should be moved and planted out at a distance of two feet apart in well manured ground, and a year later the strongest will be fit to go out into their permanent quarters. (Fig. 12).

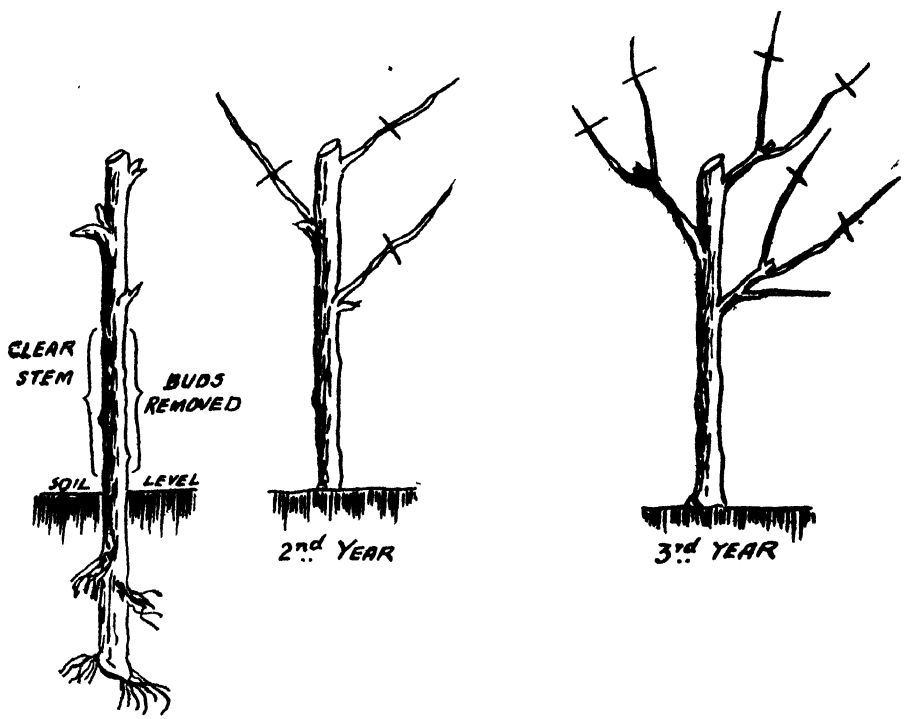


Fig. 12. Propagation of Gooseberry and Red Currant by hard wood cuttings.

In the preparation of Black Currant cuttings (Fig. 13), young shoots made during the summer are also selected but it is not essential to prepare them with a heel of old wood attached or to remove the basal buds as is done in the case of Red Currants and Gooseberries. Cuttings should only be taken from productive bushes, which should be selected and marked when carrying their crop. Cuttings should never be taken from bushes suffering from 'Big Bud' or from Reversion.

The Black Currant may also be propagated by means of soft cuttings

prepared in the manner described on page 119 and inserted during summer in a cold frame. Prior to insertion the cuttings should be steeped for fifteen minutes in an insecticide consisting of ½ oz. of Nicotine added to 2½ gallons of water containing about 4 ozs. of soft soap.

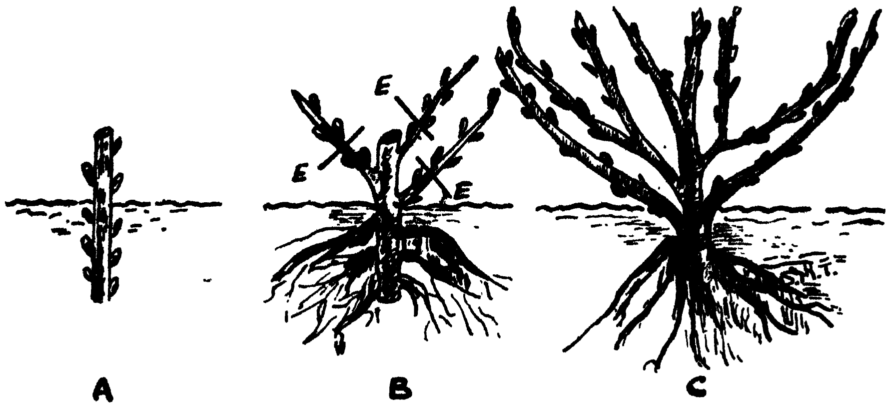


Fig. 13. Propagation of Black Currant by hard wood cuttings.
A. Cutting prepared and inserted. All buds are left on the part of cutting below ground. Only three are left above ground.
B. After one year cut back at E.E.E.
C. Two year old bush before transplanting and cutting back.

Various proprietary preparations are now available which accelerate the rate at which cuttings produce roots. These preparations may be obtained from horticultural sundriesmen and should be used according to the directions supplied.

ROOT CUTTINGS : A large number of plants may be propagated by root cuttings. Examples of such plants are Seakale, Horse Radish, Anchusa, Verbascum, Romneya, Rhus, Ailanthus, Rubus, and Mussel Plum.

The selected pieces of root are cut in lengths of from one to four inches according to the particular plant being dealt with. The portion nearest the main stem is cut straight across and the other end given a sloping cut so that the top can be identified when inserting the cutting. (Fig. 14). Root cuttings are inserted in shallow trenches out-of-doors or, if necessary, in boxes of suitably prepared compost in cold frames.

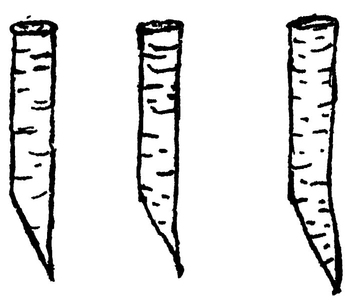


Fig. 14. Root cuttings of Horse Radish or Seakale.

LEAF CUTTINGS AND LEAF BUD CUTTINGS : The leaves of plants which are of a thick succulent nature are often used for propagation purposes. Begonia, Gloxinia, Streptocarpus and Echeveria are examples of plants which may be propagated in this way.

Full grown mature leaves are selected and prepared by removing the petioles and severing the principal veins with a sharp knife. The leaves are then laid with the upper surface exposed to the light on a suitable propagating bed in a warm frame and pegged firmly into position, using bent wire for the purpose. (Fig. 15).

Fig. 15. Propagation of Begonia Rex by means of leaf cuttings.

The Loganberry, which is frequently propagated by layering young shoots as described on Page 116, may be increased more rapidly by means of leaf bud cuttings prepared during summer in the manner shown in Fig. 16.

A shallow cut is made half an inch above and below a bud. The knife is then passed beneath the bud through solid wood parallel to the surface but not sufficiently deep to reach the pith. The cuttings are inserted immediately in prepared sandy compost in a cold frame allowing about two inches between each cutting and six inches from row to row.

The frame should be shaded and kept closed until rooting has occurred by which time ventilation should be given gradually until the cover can be removed altogether and the rooted cuttings planted in nursery rows the following autumn.

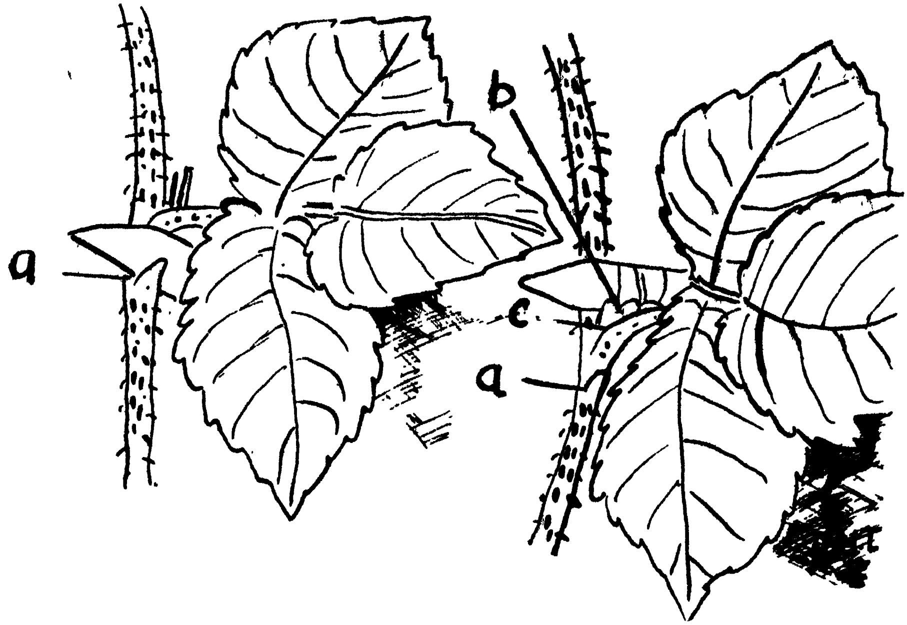


Fig. 16. Leaf Bud cuttings of Loganberry.
a. Cut made below a leaf bud.
b. Cut made above a leaf bud passing under c. through the wood but not reaching the pith.

5. PROPAGATION BY MEANS OF GRAFTING AND BUDDING.

GRAFTING AND BUDDING are methods of plant propagation in which a shoot called a "SCION" is inserted on a parent called a "STOCK" in such a way that the two unite and ultimately form one plant. In budding, the "Scion" consists of a single bud, whereas in grafting a short length of stem with several buds is used. Grafting is done in spring as soon as the sap in the stock is circulating freely, by which time the bark will lift readily when prised with a knife. Budding is normally done between June and August.

Grafting and Budding are not difficult operations though skill and experience ensure a high percentage of successful unions. The essentials for successful Grafting and Budding are that

1. the Stock and Scion must be related ;
2. the Stock must be in active growth, the Scion dormant ;
3. the Cambium layers of stock and scion must be in close contact,
4. air must be excluded from the cuts made ;
5. the scions or buds and the stocks must be free from diseases and pests.

As a matter of interest Pears may be grafted on to Hawthorn and Apples on Mountain Ash, but in practice the more closely the trees are related the more rapid and secure will be the union.

Certain varieties of Pear will not unite directly with the quince stock normally used, and in such cases it is necessary to graft a variety on to the quince which is known to take successfully and when union has occurred to graft

on to it the required variety. The variety Beurré Hardy is generally used as an intermediate for varieties such as Marie Louise, Souvenir du Congrès, and Josephine de Malines which do not "take" directly on the quince. An operation such as this is called "double working" and the trees produced are of necessity more expensive than other varieties in which such treatment is not necessary.

To ensure that the stock and scion will be ready for grafting, it is necessary to make preparation during the preceding winter. If a mature tree is to be grafted with scions of another variety all the branches except one, which is left to draw up the sap, should be cut back to within two feet or so of the main trunk. Fresh cuts will be made in spring before grafting is done. Young stocks such as those used by the nurseryman do not require cutting back in this way but can be cut back in spring when grafting is about to be done.

A supply of scions suitable for grafting must be selected in winter and stored until required for use. These consist of one year old shoots selected from amongst those removed at pruning time. The scions are left full length and "heeled in" about six inches deep in soil in a shaded situation out-of-doors. Treated this way they remain plump and dormant until required for grafting.

The Cambium layers referred to are the tissues which lie at the junction of the bark and wood. When the sap is moving in spring and the bark is lifted it will be noted that the wood is covered with a slippery layer and so also is the inner surface of the bark. This is the Cambium layer, the cells of which are responsible for such activities as forming a "callus" in cuttings before rooting, producing protective layers of cork where wounds are made, and forming unions in grafting and budding.

Great care is necessary to ensure that the Cambium layers do not dry out and, therefore, all exposed surfaces are sealed over. Various mixtures of clay and straw may be used for this purpose but grafting wax is usually found more convenient in practice. It is purchasable in a proprietary form or, if desired, can be prepared at home, although this is somewhat troublesome.

The principal methods of grafting are (*a*) Whip or Tongue grafting, (*b*) Crown or Rind grafting, (*c*) Saddle grafting, (*d*) Cleft grafting, (*e*) Stub and Bark grafting, (*f*) Bridge grafting and (*g*) Inarching.

WHIP OR TONGUE GRAFTING (Fig. 17) is the method practised by the nurseryman and professional plant propagator. The stock and scion should be about equal in thickness with the stock in more active growth than the scion.

The scion is obtained from a mature year-old shoot. The stock and the scion are prepared by cutting fresh surfaces, fitting them together neatly as shown in diagram, tying firmly with raffia and covering over with grafting wax.

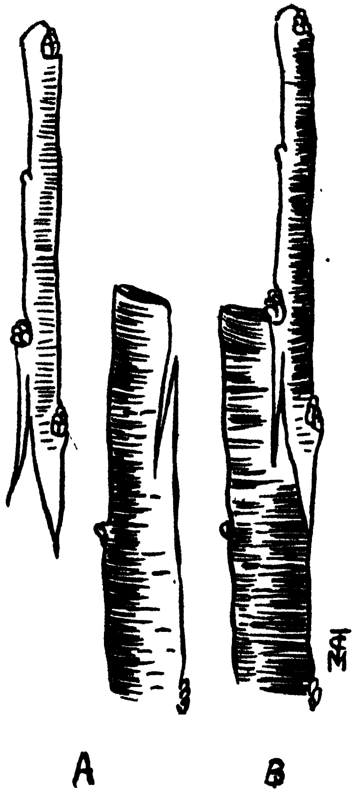


Fig. 17. Whip or Tongue Grafting.
A. Stock and Scion prepared.
B. Scion inserted before tying with raffia and waxing.

CROWN OR RIND GRAFTING (Fig. 18). In this case the stock may be quite large and have a number of scions inserted on it. It is one of the simplest and most popular methods of grafting, finding application in commercial orchards as well as in private gardens. It is particularly useful where it is desired to grow several varieties of apple or other fruit on the same tree, where it is necessary to renew or renovate old or unprofitable trees, or where it is desirable to introduce additional varieties to act as pollinators in an orchard.

The scion is prepared by making a sloping cut about two inches long ending in a very thin point. The stock is cut off level and pared with a sharp knife. A slit is then made in the bark, not quite equal in length to the cut made in the scion. The bark is then raised gently by means of the knife and the scion pushed between the wood and bark until the cut surfaces touch completely. Up to four such scions may be inserted on branches over four inches in diameter and, after insertion, all are bound with raffia and the cut surfaces covered carefully with grafting wax to exclude air and keep out disease organisms.

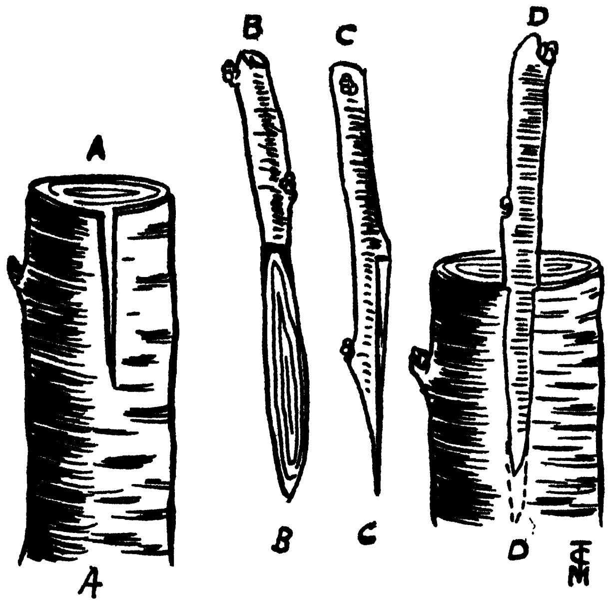


Fig. 18. Crown or Rind Grafting.

A. Stock prepared for insertion of scion.
B. and C. Scion prepared.
D. Scion inserted on stock ready for tying and waxing.

SADDLE GRAFTING (Fig. 19) : Saddle grafting is used when stock and scion are about the same thickness. The method of fitting the exposed tissues is shown in accompanying diagram.

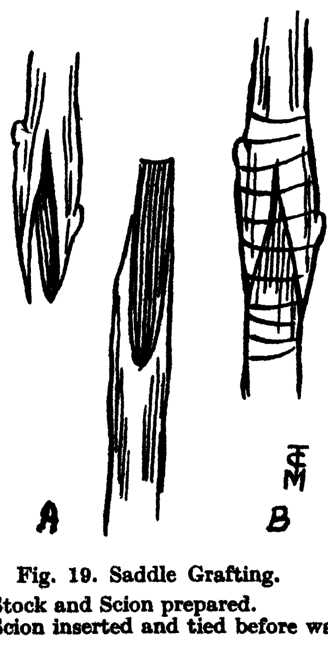


Fig. 19. Saddle Grafting.

A. Stock and Scion prepared.
B. Scion inserted and tied before waxing.

CLEFT GRAFTING (Fig. 20) : In Cleft grafting the branch selected is cut across and pared smooth. A split is then made in the branch with a chisel or small hatchet, care being taken that the clefts thus made are no deeper than is necessary to hold the scions firmly. A wedge is then inserted to keep the split open for the reception of the scions.

The scions should be prepared by making a sloping cut about one and a half inches long on one side of the lower end of the scion and a similar cut on the opposite side, thus forming a thin wedge. The top of the wedge should terminate at a bud. The scion is then inserted in the split with the bark coinciding with that of the stock and the wedge withdrawn, allowing the branch to close on the scion and hold it firmly in position. The cleft is then sealed over with grafting wax and the exposed surface of the branch coated over with the same material to prevent drying out and also to exclude disease organisms.

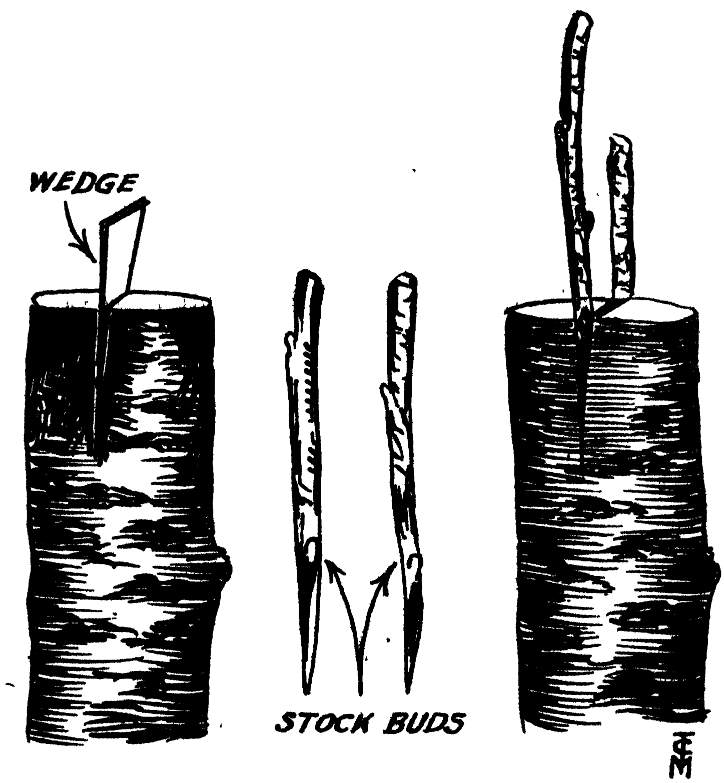


Fig. 20. Cleft Grafting.

STUB GRAFTING AND BARK GRAFTING (Fig. 21) : These methods of grafting are used when it is desired to "frame work" or renew unsatisfactory or unprofitable trees in an orchard. Instead of heading back all the leading branches as would be done for crown or cleft grafting, the leading branches

are retained and rebuilt with scions of another variety inserted at intervals along the branch.

In stub grafting the scion is cut like a wedge and inserted into the base of a lateral shoot which holds it in position and is cut back after the scion is inserted. The cut surfaces are then covered with grafting wax. (Fig. 21A.).

In bark grafting all the lateral shoots are removed and the scions inserted directly on the main branches. The scion is prepared in the form of a long wedge and pushed into a 7 shaped cut in the bark. It is held firmly by a thin nail driven through the bark and scion into the wood and waxed over. (Fig. 21B.).

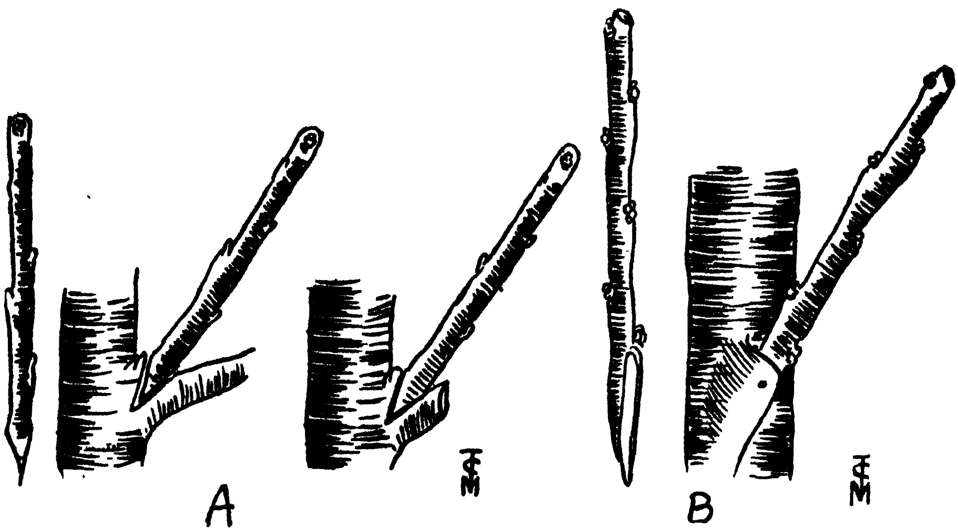


Fig. 21.
A. Stub Grafting.
B. Bark Grafting.

BRIDGE GRAFTING : Many valuable trees are lost annually as a result of damage to the bark on the lower part of the trunk by rabbits, hares or farm implements or by encirclement due to canker fungus, etc. Trees so damaged may often be saved by Bridge grafting and Inarching. (Figs. 22 and 23). Both edges of the girdled area should be trimmed back evenly and the exposed wood painted over with a good quality white lead paint.

There are several methods of preparing and fitting the scions in Bridge grafting but a usual method is to cut the scions to a wedge shape at both ends. Vertical incisions about an inch long should then be made in the bark above and below the wound and at the points where the ends of the scions will be inserted. This is done by raising the edges of the slit bark by means of a knife

and pushing the ends of the scions under the bark at this point. A small brad or fine nail should be driven through the scion into the wood to hold the scion firmly in position. Several scions should be inserted at intervals of about two inches round the damaged trunk and all exposed cuts covered over with grafting wax :—

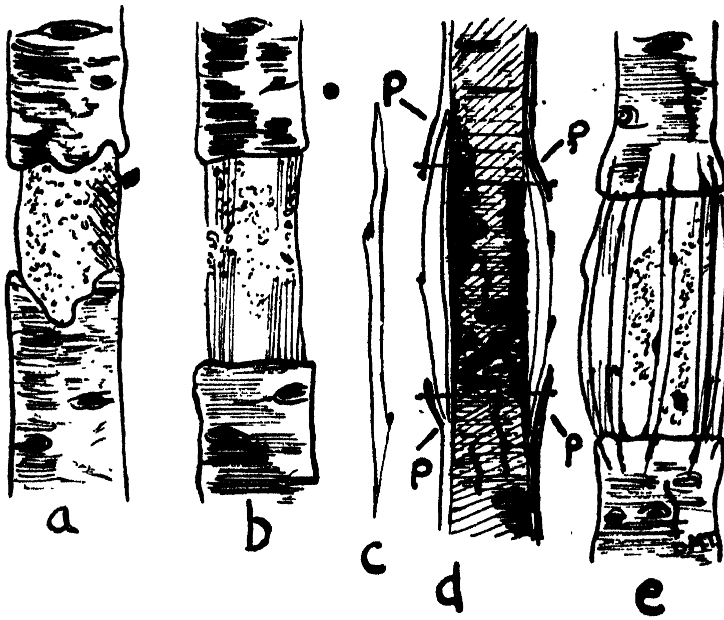


Fig. 22. Tree repair by means of Bridge Grafting.

a. Apple tree girdled by rabbits.
b. The wound trimmed and wood painted over.
c. Scion prepared.
d. Scions inserted and nailed under lifted bark at P.
e. Scions inserted prior to waxing over.

INARCHING is a method of grafting applicable to many plants which are difficult to propagate by other means and may also be used to save fruit trees which are damaged at or near ground level or are otherwise unsuitable for bridge grafting as described above.

One or more young stocks are obtained and planted beside the damaged tree. The sides of the stocks next to the injured trees are prepared by cutting away the bark and fitting them into grooves of similar size made in the bark of the tree receiving treatment. Once in place the scion can be held in position by means of a fine brad and waxed over to exclude air. The top of the scion which extends above the points of contact can be left to grow and removed when the union has occurred (Fig. 23).

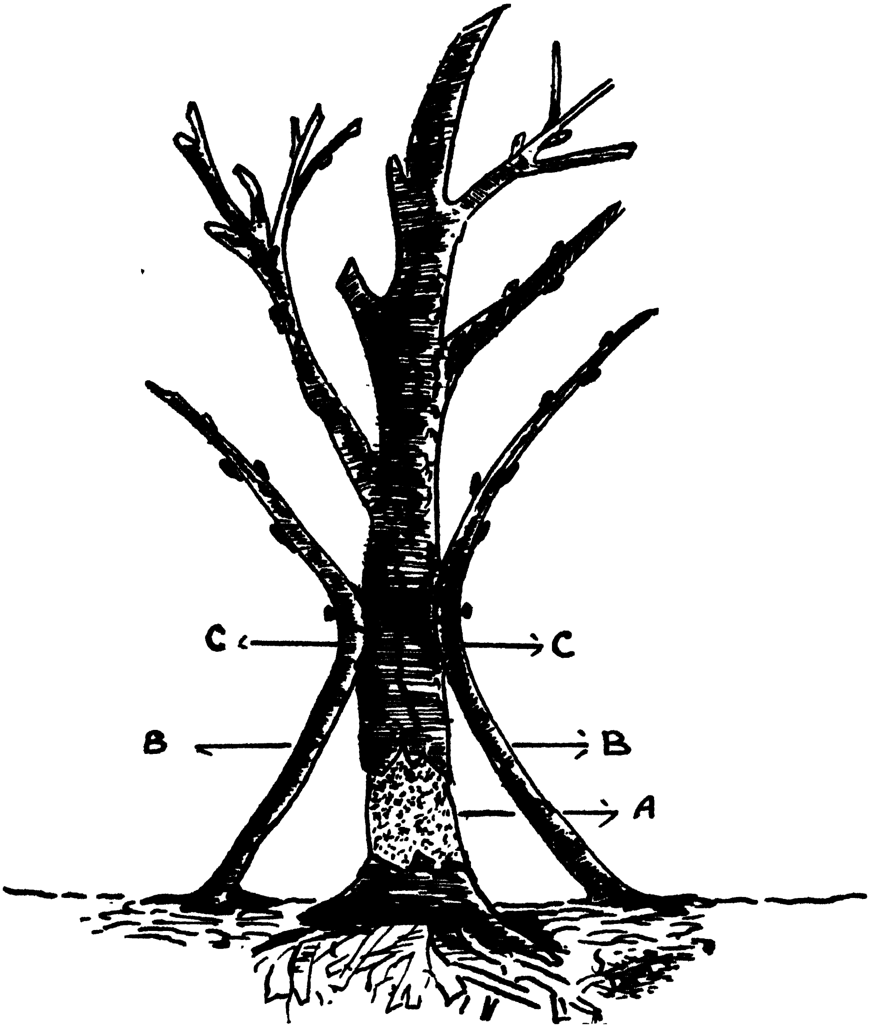


Fig 23. Inarching.

A. Damaged area.
B. Young stocks planted near damaged tree.
C. Point at which stock and scion are fitted together and nailed after paring off equal areas of bark in each.

BUDDING is a method of plant propagation in which the stock is usually quite small and the scion consists of a single bud instead of a length of shoot. Budding is done during the summer months from June to September according to the condition and type of tree or shrub. July and August are, however, the favoured months.

The shoots from which the buds are taken should be current year growths selected with care to ensure that wood buds and not fruit buds are selected. As soon as the shoot is removed from the parent tree the leaf blades should be cut off, leaving only the leaf stalks as a precaution against loss of water and wilting. The bud is cut out with a sharp knife in the manner shown in the diagram and the woody base removed with a sharp pull.

A T-shaped cut not exceeding two inches in either direction is made in a smooth portion of the bark of the stock and the prepared bud pushed into the slit, tying it firmly with raffia. Waxing over is rarely required but care should be taken that the bud is left exposed when tying has been completed.

In about a month's time the raffia may be cut or released and the stock cut back in February to a point just above the bud. All subsequent growths made by the stock must be removed.

Fig. 24. Budding.

A. Shoot selected.
B. Leaf blades removed.
C. Prepared Bud.
D. Prepared Stock.
E. Bud inserted.
F. Bud tied with raffia.

Details of the many operations necessary in the various methods employed in plant propagation are perhaps more easily understood from practical demonstration and advice which are available free through the horticultural instructors employed by the Committees of Agriculture. Those interested are invited to avail of this form of practical assistance provided for them.

MARKETING OF WILD FRUITS

While there has at all times been a market for certain wild fruits, in late years this market has greatly expanded owing to various causes which have rendered the supply of cultivated fruits, particularly from overseas sources, less readily obtainable. An increased demand for wild fruits has accordingly resulted and a considerable trade has developed in the exportation to Britain, particularly of blackberry pulp. Proper methods of picking, handling and preparing the fruit for market, which are described below, must, however, be observed if this trade is to be maintained, especially when supplies of cultivated fruits become more easily obtainable.

BLACKBERRIES.

Picking of Blackberries.

Blackberries should be picked when dry and at the stage when they have developed a " blue black " bloom. Immature fruits do not ripen after they are gathered and should not be included as they spoil the flavour of properly matured fruits with which they are cooked. Over-ripe fruits on the other hand do not bear transit without considerable deterioration and, as they decompose very rapidly, should so far as possible be avoided.

Pickers should be instructed to observe cleanliness at all stages. They should wash their hands frequently and use clean pails or baskets which should be washed and dried each day after picking. Leaves or stalks should not be mixed with the picked fruit.

Packing Blackberries for the Fresh Fruit Market.

For the fresh fruit market blackberries may be packed in chip baskets holding 4 lb., 6 lb. or 12 lb. nett weight.

Fruit packed in such containers is required for retail purposes and it is essential that it should be in thoroughly good condition when it reaches the market. It should be picked before becoming fully ripe and at the stage when if turned out on a table the berries would roll about separately. The chip baskets in which the fruit is to be sent to market should be lined with thin parchment or grease proof paper, so placed as to cover the bottom of the basket and its sides to a height of two inches from the bottom; this will protect the fruit from dirt and prevent it being squeezed through the apertures in the bottom of the basket. The fruit

should be carefully examined when it is being transferred from the pickers' baskets to those in which it is to be sent to market so as to ensure that leaves, stalks, over-ripe or unripe berries are not included.

The baskets should be covered with cardboard covers securely tied to protect the fruit from damage.

PACKING OF FRESH BLACKBERRIES FOR LOCAL JAM MANUFACTURERS.

Fresh blackberries intended for sale in bigger quantities to local jam manufacturers may be packed in clean sound barrels each holding not more than 100 lb. to 112 lb. of fruit. Many jam firms prefer to buy blackberries in barrels or kegs holding not more than 56 lb. of fruit and in some cases will supply suitable containers on request.

Arrangements should be made to forward the fruit in a fresh condition and at very frequent intervals. Large barrels capable of holding two or three cwt. of blackberries are unsuitable and should not be used.

PRESERVATION OF BLACKBERRIES IN SULPHUR DIOXIDE (SO_2).

Blackberries intended for distant markets or for manufacturing purposes are usually preserved by the addition of suitable chemicals. The chemicals used must be cheap, capable of checking the development of moulds, yeasts and bacteria, and at the same time of such a nature that the preserved fruit is not tainted or otherwise rendered unsuitable for human consumption. In practice, sulphur dioxide (SO_2) has been found most satisfactory in fulfilling these requirements. Its special value lies in its volatile nature. Fruit preserved in it can be freed from taint by boiling, when the sulphur dioxide is rapidly driven off as a gas.

Treatment with sulphur dioxide destroys temporarily the characteristic natural colour of the blackberry but this is almost completely restored when the preservative is driven off during cooking.

Sulphur dioxide is usually bought as a solution of sulphurous acid containing about 6 per cent. of SO_2. Supplies of 6 per cent. SO_2 may be obtained from firms specialising in the supply of chemical preparations. Cross-channel firms interested in the importation of blackberries are frequently in a position to provide or procure the chemical for persons supplying them with fruit. It is important, however, that arrangements regarding its procurement are made well in advance of picking and exporters are urged to deal with this matter early in the season. The Department will supply if necessary a list of firms normally engaged in the preparation or sale of SO_2.

RAW BLACKBERRY PULP.

The essentials in processing blackberries with SO_2 are:

1. The fruit should be clean and fresh.
2. Sound, clean and sterile casks should be used.
3. The amount of SO_2 added should be as near as possible to 1,500 parts per million of pulped produce. This amount of preservative is permitted under the Public Health Food Regulations and will be obtained approximately by adding three pints of 6 per cent. SO_2 solution to each cwt. of fruit.
4. The preservative must be thoroughly mixed with the fruit to prevent fermentation in any portion of the mass.

The same care should be taken in picking the fruit as if it were intended for the fresh fruit market. The casks which must be perfectly sound, clean and odourless, should be sterilised by means of steam. The required quantity of 6 per cent. SO_2 solution should be measured out at the rate of three pints per cwt. of fruit. Portion of this solution should then be poured through the bung hole into the empty cask and the fruit filled in until the cask is about half full, when more of the solution should be poured in. Then, when the cask is almost full and before the bung is inserted, the remainder of the sulphur dioxide should be added.

The casks should be rolled several times immediately after filling and this operation should be repeated on several succeeding days to ensure thorough penetration of the preservative.

If the sulphur dioxide is not thoroughly distributed through the mass of the pulp, fermentation may develop in the casks and result in the decomposition of the fruit or the bursting of the containers, which is known to have occurred, with explosive force capable of causing fatal injury to those handling them.

COOKED BLACKBERRY PULP.

The preparation of cooked blackberry pulp requires efficient steam equipment. If more elaborate equipment is not available the cooking may be carried out in large wooden vats or barrels having perforated steam coils fitted near the bottom. Copper and stainless steel are suitable for the construction of steam coils but iron and brass are not. A good sized discharge valve or plug should be fitted at the bottom of each vat or barrel.

Steam condensation will occur during the cooking process and will result in the presence of a certain amount of water in the cooked pulp. One cwt. of pulp may, in the time taken for its cooking, be expected to condense about 16 lb., or more than one and one-half gallons, of water from dry steam passed in at a

pressure of 80 lb. per square inch. An even greater quantity of water is likely to be present unless precautions, such as the fitting of steam traps outside the vats or " blowing off " at intervals, are observed. As, however, not more than one and one-quarter gallons of water per cwt. of fruit should be permitted to remain in the finished product, it will be necessary that any quantity of water in excess of this should be driven off by evaporation during cooking.

In the actual cooking process a weighed quantity of selected blackberries is placed in the cooking vat, care being taken that sufficient space is left to prevent overflowing when the steam is turned on. From three to seven minutes actual boiling is usually sufficient for blackberry cooking, the idea being to ensure softness without undue breakdown of the berries.

The fruit after cooking is run off into a large wooden collecting vessel from which it is poured into the storage casks. These casks must be sound, clean and odourless. They should be sterilised with steam before filling. The amount of 6 per cent. sulphur dioxide solution required is again three pints per cwt. of fruit.

Part of the preservative is poured into the empty barrel and some of the cooked fruit poured through the bung hole with the aid of a funnel. When the cask is half full more SO_2 solution is added, and the remainder poured in before the cask is filled and the bung inserted. The cooked fruit in the collecting vessel should be kept stirred to ensure a uniform mixture of fruit and liquor. The filled cask should be rolled several times immediately after filling and this operation repeated on succeeding days to ensure thorough penetration of the preservative.

STORAGE OF PULP.

Blackberry pulp whether raw or cooked should be stored in a cool shaded place and if possible under cover. Casks should be examined at intervals for the presence of leakages or blown heads.

BILBERRIES.

Bilberries, which are also called "Whorts," "Hurts" and "Fraughans," grow in wooded glens and on heather covered hills. It is believed that the trade in bilberries might be increased considerably and that this fruit might be collected and exported from many parts of the country, especially the south and west, where it is to be found in quantity.

Bilberries when ripe and ready for picking, which is usually in July or early August, bear an exquisite blue-black bloom which it is most desirable to retain as long as possible but which will be lost if the fruit is roughly picked or handled. Fruit intended to be sold fresh should be sent to market immediately after

picking as it deteriorates if held over. The berries should be despatched to market in chip baskets containing 5 or 6 lb. of fruit. The baskets should be lined with paper as described for blackberries. The weight of fruit packed in each basket should be slightly in excess of the proposed market weight to allow for loss in transit. The fruit should be covered with a sheet of tissue, parchment or greaseproof paper and, to protect the berries when the containers are stacked during transit, each basket should be covered with a stiff cardboard chip-lid securely tied down. Intending exporters should provide themselves early in the season with a sufficient quantity of chip baskets for their requirements.

Cooked bilberry pulp may be prepared and preserved in SO_2 in the manner described in respect of blackberries.

CRAB APPLES.

Wild crab apples vary considerably in size and appearance; and are usually sold mixed as to size and variety under the name of "crabs." In favourable seasons very large quantities are obtainable. The principal demand for this fruit comes from manufacturers of jelly, who require the fruit as large as possible, but in a green condition as they contain a maximum of pectin. In certain seasons when cultivated varieties of apples suitable for cider making are in short supply the cider factory may provide a profitable outlet for crabs. It is a mistake to gather crab apples when they are small. They should be allowed to grow as large as possible provided that they are gathered before they mature and assume a yellowish tint. When the apples ripen their commercial value depreciates considerably.

Crabs should be packed in sacks containing not more than 1 cwt., and filled only to such an extent that when the sacks have been laced a handgrip is provided at each corner of the mouth. Failure to provide such handgrips may result in the sacks being thrown roughly about to the detriment of the fruit and the lowering of its value.

The preparation and preservation of cooked apple pulp resembles that already described in this leaflet in relation to blackberries.

Seeds and cores may be removed by passing the cooked pulp through suitable sieves before preservation.

SLOES.

The sloe, which is the fruit of the blackthorn, is obtainable in many parts of the country more especially in the south. The demand for it is, however, limited and variable. The fruit is ready for picking when it is completely black and has a full rich bloom. On no account should unripe green sloes be picked.

The best container for transporting sloes is a chip basket of large capacity. Sloes are not so perishable as blackberries or bilberries and may, therefore, be forwarded by goods train unless otherwise directed by the buyer. In common with the other fruits referred to, sloes when packed should be entirely free of leaves, twigs, etc.

GENERAL.

Persons proposing to engage in the gathering of wild fruits would be well advised to make all necessary arrangements for marketing before commencing operations. A number of firms throughout the country is established in the business of buying such fruits for exportation or marketing at home.

It is also advisable that to avoid loss, delays in transit, etc., persons or firms proposing to embark on the exportation of fruit should ensure that all import and other requirements of the countries to which it is proposed to despatch the fruit have been complied with. The firms to which it is proposed to send the fruit should be in a position to obtain and furnish all necessary information in this connection.

FRUIT CROP REPORT, 1947

The apple crop of 1947 can be reckoned as one of the worst since 1938. Trees bloomed profusely, and although there was no severe frost during the brief flowering period, night temperatures were so low that conditions for pollenation were not generally satisfactory and the set of fruit was exceptionally small. Hail showers in June further hindered the development of the fruit in some districts.

Crops of pears, plums and damsons were generally described as average to very bad.

Soft fruits produced crops well up to average although reports from parts of the South and East, particularly from sea-coast areas, indicated that a good deal of damage was caused to raspberry and blackcurrant crops by harsh winds during April.

Weather Conditions : January was wet and stormy with snow and heavy frost during the last week of the month. Frequent snow-falls, harsh winds and heavy frost occurred during the first three weeks of February and a blizzard on 25th caused extensive damage. Weather during March was also severe with snow, sleet and heavy rain up to 17th, the remainder of the month being milder, but excessively wet. Conditions during April were unsettled at first and were followed by a dry mild spell with storms and heavy rain towards the end of the month.

Unsettled weather continued till the last week of July, when summer conditions set in and extended throughout August and part of September. Heavy rain fell during three days of the last week of October, causing flooding in many areas.

November was mild though unsettled for the greater part, with snow, flooding and night frosts during the third week. December was mainly fair with some night frosts.

Incidence of Disease and Pests : As the weather report might indicate there was very little opportunity for carrying out the usual winter spraying of

fruit trees and it was not surprising to find that such insect pests as aphis, apple sucker and red spider were reported to have caused a good deal of damage during the season. The dry warm conditions during autumn were suitable for the migration of aphides with the result that apple trees in most areas were found to be densely covered with eggs. Red spider seemed to be on the increase in most areas and apple capsid also appeared to be causing concern to growers in many districts.

Apple and pear scab was more in evidence than usual due to the fact that dull unsettled weather favoured its spread. Weather was unsuitable for applying scab sprays and, consequently, growers were unable to carry out a full-scale spraying programme.

American gooseberry mildew caused a good deal of damage to the crop although spraying for control of this disease is now more generally practiced than in the past. Strawberry growers in many districts suffered heavily as a result of attacks of botrytis during the picking season when periods of dull moist weather prevailed.

Table showing in a general way the nature of the yields obtained in each County.

County	Gooseberries	Strawberries	Raspberries	Loganberries	Red and White Currants	Black Currants	Apples	Pears	Plums	Damsons	Other Fruits
Carlow ...	Good	Good	Good	Very Good	Good	Average	Bad	Bad	Average	Average	Good
Cavan ...	Good	Good	Good	Very Good	Good	Average	Very Bad	Bad	Average	Average	Average
Clare ...	Average	Good	Below Average	Average	Good	Below Average	Bad	Bad	Below Average	Bad	Average
Cork ...	Below Average	Good	Below Average	Average	Average	Average	Very Bad	Bad	Average	Bad	Average
Donegal ...	Average	Average	Good	Average	Good	Average	Very Bad	Very Bad	Good	Below Average	Good
Dublin ...	Below Average	Below Average	Average	Average	Average	Below Average	Very Bad	Very Bad	Below Average	Below Average	Good
Galway ...	Average	Good	Average	Good	Average	Good	Very Bad	Average	Average	Below Average	Average
Kerry ...	Below Average	Good	Bad	Average	Bad	Average	Very Bad	Bad	Below Average	Bad	Average
Kildare ...	Good	Average	Average	Good	Good	Good	Very Bad	Bad	Bad	Below Average	Good
Kilkenny ...	Average	Good	Average	Average	Good	Average	Very Bad	Bad	Bad	Below Average	Below Average
Laoighis ...	Good	Good	Good	Good	Good	Good	Very Bad	Bad	Bad	Bad	Average
Leitrim ...	Good	Below Average	Average	Average	Very Good	Good	Very Bad	Average	Average	Bad	Average
Limerick ..	Average	Good	Good	Good	Good	Good	Very Bad	Very Bad	Bad	Bad	Average
Longford ..	Average	Good	Good	Average	Good	Good	Very Bad	Very Bad	Bad	Average	Average
Louth ...	Good	Good	Good	Average	Average	Good	Very Bad	Bad	Bad	Very Bad	Average
Mayo ..	Good	Good	Good	Average	Good	Good	Very Bad	Average	Bad	Average	Average
Meath ..	Good	Good	Good	Average	Good	Good	Very Bad	Bad	Below Average	Below Average	Average
Monaghan ...	Good	Good	Good	Below Average	Good	Good	Very Bad	Average	Below Average	Below Average	Below Average
Offaly ...	Average	Average	Good	Good	Very Good	Very Good	Very Bad	Bad	Below Average	Average	Average
Roscommon ..	Good	Below Average	Average	Good	Good	Very Good	Very Bad	Below Average	Average	Good	Good
Sligo ...	Good	Average	Average	Good	Good	Very Good	Very Bad	Bad	Bad	Bad	Average
Tipperary N.R.	Very Good	Good	Good	Good	Good	Very Good	Very Bad	Bad	Average	Average	Average
Tipperary S.R.	Good	Average	Average	Good	Good	Average	Very Bad	Very Bad	Below Average	Average	Average
Waterford ...	Average	Good	Average	Average	Good	Below Average	Very Bad	Bad	Bad	Bad	Below Average
Westmeath ..	Good	Very Good	Good	Below Average	Very Good	Very Good	Bad	Bad	Average	Good	Average
Wexford ...	Good	Below Average	Good	Good	Good	Good	Very Bad	Bad	Bad	Bad	Below Average
Wicklow ...	Good	Very Good	Good	Good	Very Good	Very Good	Very Bad	Bad	Below Average	Below Average	Below Average

DUBLIN MARKET.

Periods during which the various fruits were on offer in commercial quantities.

Apples: Gas stored of the 1946 crop up to 9th July, 1947, and from mid-August onward, apples of the 1947 crop were available.

Plums: 12th August to 10th October.

Damsons: 13th September to 3rd October.

Gooseberries: 24th May to 19th August.

Strawberries: 18th June to 12th August.

Raspberries: 5th July to 27th August.

Loganberries: 19th July to 12th August.

Blackcurrants: 5th July to 1st August.

Red Currants: 5th July to 13th August.

MARKET PRICES.

APPLES:

Dessert Varieties. Early	8/– to 16/– and up to 20/– per stone.
Mid-season	4/– to 18/– per stone.
Late ,,	4/– to 15/– and up to 20/– per stone.
Culinary Varieties: Early	8/– to 14/– per stone.
Mid-season	2/– to 7/6 ,,
Late ,,	3/– to 10/– ,,

Culls and crab apples for manufacturing purposes 10/– to 14/– per cwt.

PLUMS:

10/– to 30/– per 12 lb. chip.

Jam Fruit 36/– to 48/– per cwt.; Victoria 56/– per cwt.

DAMSONS :

	6 to 12/– and up to 18/– per 12 lb. chip.
Jam Fruit	55/– per cwt.

GOOSEBERRIES :

	6/– to 12/– per 12 lb. chip.
Jam Fruit	46/8 to 49/– per cwt.

STRAWBERRIES :

	5/– to 12/– per lb. for early arrivals.
Later	1/4 to 2/8 and up to 4/– per lb.
Jam Fruit	88/8 to 98/– per cwt.

RASPBERRIES :

	1/– to 2/3 per lb.
Jam Fruit	79/4 to 84/– per cwt.

LOGANBERRIES :

	9d. to 1/– and up to 1/6 per lb.
Jam Fruit	60/– per cwt.

BLACK CURRANTS :

	9d. to 1/– and up to 1/6 per lb.
Jam Fruit	88/8 per cwt.

RED and WHITE CURRANTS :

	6d. to 1/2 per lb.
Jam Fruit	56/– per cwt.

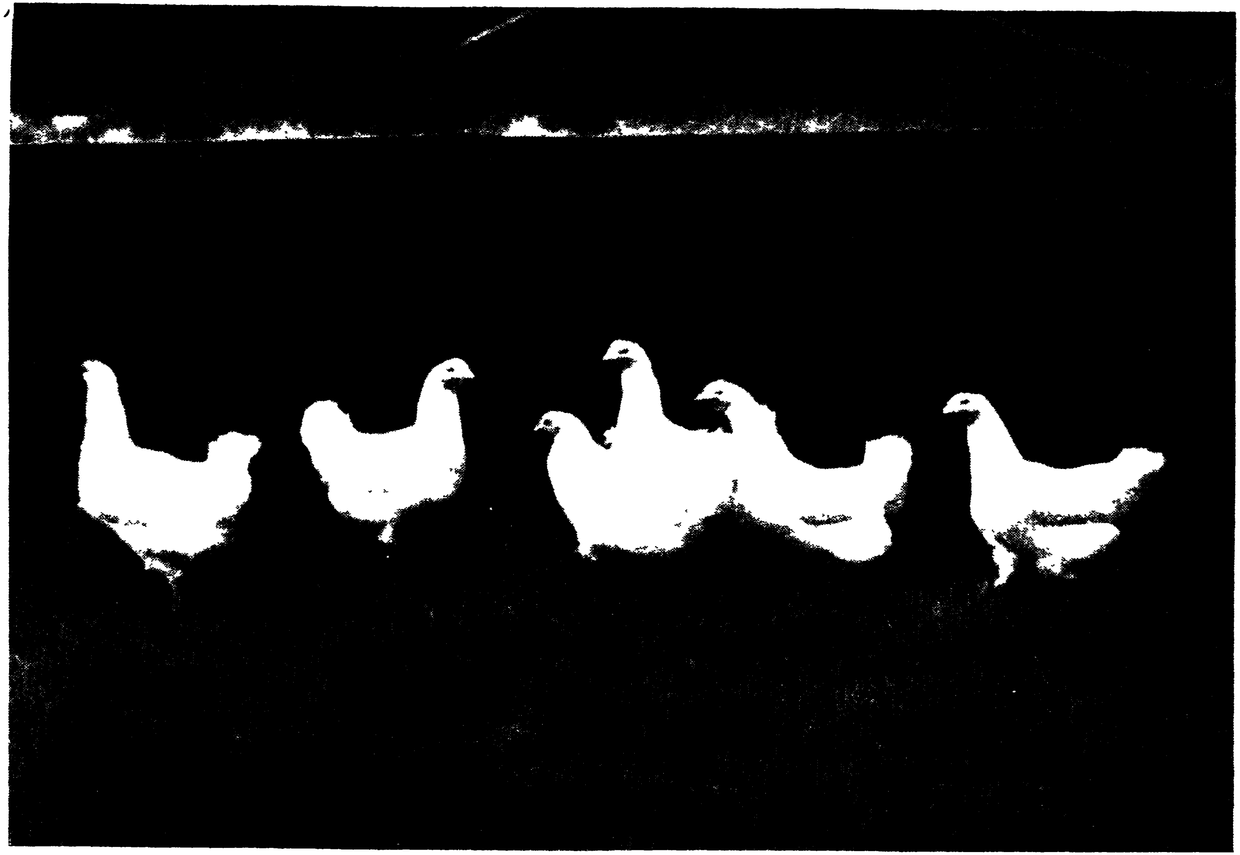
BLACKBERRIES :

45/– per cwt.

BILBERRIES :

56/– to 84/– per cwt.

NATIONAL EGG-LAYING TEST, 1946-47



Pen No. 25 (White Wyandotte), owned by Mrs. M. Connolly, Carrigamore, Corvally P.O., Co. Monaghan, which won the **Silver Cup.**

NATIONAL EGG-LAYING TEST, 1946-47.

The Thirty-fifth Egg-Laying Test, conducted by the Department of Agriculture, was held at the Munster Institute, Cork, during a period of 46 weeks, beginning on 1st October, 1946, and ending on 18th August, 1947. A total of 95 pens, each consisting of six pullets, having fulfilled the required conditions, was accepted and arranged in Sections as follows :—

Section I.—White Wyandotte	.. ..	12 pens
Section II.—White Wyandotte (confined to holders of Hen or Hen and Duck Stations in 1946)	.. .. ..	12 „
Section III.—Rhode Island Red	.. ..	22 „
Section IV.—Rhode Island Red (confined to holders of Hen or Hen and Duck Stations in 1946)	.. .. ..	28 „
Section V.—Any non-sitting breed	.. ..	8 „
Section VI.—Any other utility breed	.. ..	13 „

Station holders were, as heretofore, allowed to enter a second pen in one of the open sections.

Only pullets which were certified by the Veterinary College, Ballsbridge, Dublin, as being non-reactors to the agglutination test for bacillary white diarrhoea were accepted.

Minimum Weights. The following were the prescribed minimum weights for the respective breeds at the start of the test :—

All non-sitting breeds	..	3 lb.
White Wyandotte	.. ..	4½ lb.
Rhode Island Red	.. ..	4½ lb.
Plymouth Rocks	.. ..	5 lb.
Sussex	.. .. ..	5 lb.
Any other sitting breed	..	5 lb.

Eggs were graded as follows :—

Egg Grades.

Special Grade.—2⅛ ozs. and over for the first eight weeks (1st October to 25th November inclusive), 2¼ ozs. and over throughout the remainder of the test.

First Grade.—A minimum of 1⅞ ozs. for the first eight weeks (1st October to 25th November, inclusive), and a minimum of 2 ozs. during the remainder of the test.

Eggs which weighed less than the weight prescribed for first grade were recorded but were not counted for scoring purposes.

System of Scoring.

The system of scoring for the award of prizes was as follows :—

(*a*) Only special and first-grade eggs were counted for scoring purposes.

(*b*) The scoring for each egg of these grades was similar and as follows :—

Three (3) points for the first 12 weeks (1st Oct. to 23rd Dec.).

Two (2) points for the next 24 weeks (24th Dec. to 9th June).

Three (3) points for the remaining 10 weeks (10th June to 18th August).

(*c*) Points were not awarded for eggs defective in colour, shape or shell texture, but all such eggs were included in the records of production.

Ineligibility for Section Prizes.

Section prizes were not awarded to pens which produced less than 900 scoring eggs nor special prizes to those laying less than 1,000 scoring eggs.

The following birds were not eligible for individual awards :—

(1) Birds that failed to complete the test.

(2) Birds that failed to pass the blood agglutination test for bacillary white diarrhœa at the conclusion of the test, and those showing breed or other defects considered undesirable in breeding stock.

(3) Birds that failed to reach, at the conclusion of the test, a body weight of half a pound over the minimum weight prescribed for the breed at the commencement of the test.

Egg Yields. Making no allowance for deaths, the average number of eggs per bird was 178.1. The average number of eggs per bird for which a record for the full 46-week period was available was 187.1 (see Table II). The corresponding figures in the previous test were 164.9 and 176.0 respectively. The average production per bird during each of the twelve periods for each breed is given in Table III.

Egg Size. Four pens produced more than 20 per cent. of eggs under first grade.

Egg Weights. The average weight of egg for each of the competing breeds is shown in Table IV. The average weight per dozen eggs for all breeds was 27.1 oz., as compared with 26.8 oz. for the previous test. In Table V are given the number and percentage of the different grades of eggs for each breed in respect of birds which completed the full 46-week period.

Copper Rings. Of the 496 birds which completed the full 46-week period, 159 or 32.1 per cent. laid 200 or more special and first-grade eggs and not more than 20 per cent. under first grade. Of these, 144 were leg-banded with numbered sealed copper rings. Copper rings were withheld from the following 15 birds which were not suitable for breeding purposes :—

(*a*) Breed Standard Defects :—
- 4 White Wyandotte.
- 5 Rhode Island Red.
- 1 White Leghorn
- 2 Light Sussex.

(*b*) Constitutional Defects :—
- 1 White Wyandotte.
- 1 Rhode Island Red.

(*c*) Under Prescribed Weight :—
- 1 White Wyandotte.

A total of 151 birds, representing 30.4 per cent. of the number surviving the full period of the test, laid over 169 but less than 200 special and first-grade eggs. Birds which laid more than 20 per cent. of eggs under first grade are not included in the foregoing total (see Table VII).

Mortality. During the period of the test 74 birds died, representing a mortality of 13.0 per cent., and an increase of 1.9 per cent. as compared with the previous test. The distribution of the total deaths amongst pens was as follows :—

6 pens	3 deaths each.
11 „	2 „ „
34 „	1 death „

In the remaining 44 pens all birds completed the test. Table IX gives particulars of the birds that died and the cause of death in each case.

Almost 40 per cent. of the mortality was caused by peritonitis and oviductitis. The incidence of lymphomatosis in various forms was slightly lower than in the previous test.

B.W.D. Test. At the conclusion of the test the birds were submitted to the agglutination test for bacillary white diarrhœa, and there were no reactors.

Feeding. The system of feeding was similar to that in previous tests. The birds were fed three times daily. The morning feed consisted of half the grain ration ; the mid-day feed of wet mash, and the evening feed of the remainder of the grain ration. Dry mash was fed *ad lib.*

The dry mash consisted mainly of ground oats, barley meal and milling offals with small quantities of maize meal when available. Fish meal and a small proportion of dried yeast were used as the sources of protein.

The wet mash consisted of a mixture of the dry mash and boiled potatoes. Cabbage, kale, turnips and mangels were fed during winter and spring. Limestone grit was allowed *ad lib.*

NOTES ON COMPETING BREEDS.

WHITE WYANDOTTE.

Sections I and II. The majority of the birds in the twenty-four pens in these sections were of good quality and well developed. In a few pens individual birds of poor type and lacking in body size were included. Production, egg size and quality in these sections were excellent, but mortality was high.

The winning pen, No. 25—in Section II, entered by Mrs. Connolly, Carrigamore, Corvally P.O., Co. Monaghan—also won a silver cup for the best pen in the test. The six birds were of high standard and laid 1,320 special and first-grade eggs during the test.

RHODE ISLAND RED

Sections III and IV. Most of the birds in the fifty pens were excellent specimens of the breed. Plumage colour with a few exceptions was particularly good. A few pens were backward on arrival and were slow to come into production. Egg yield and egg size were very satisfactory but some birds were consistent producers of poor quality eggs. Mortality in this breed was higher than in the previous test. One bird in Section IV did not lay during the test.

ANY NON-SITTING BREED.

Section V. The eight pens of White Leghorns which made up this section were good specimens of the breed. Production, egg size and quality reached high standards. Mortality was higher than in previous tests.

ANY OTHER UTILITY BREED.

Section VI. Eleven pens of Light Sussex and two pens of Buff Rocks were included in this section. The Light Sussex entries were well selected, well developed birds of good colour. Production was high, quality and size of eggs were well up to standard. Mortality was lower than in the other breeds. One bird did not lay during the test.

The two pens of Buff Rock were average in quality and performance.

CONCLUSION.

The results of the test generally were satisfactory. The majority of the birds entered were well developed and good representatives of their breeds. Egg production was high while egg size and quality reached satisfactory standards. Mortality was higher than in previous tests but the greater proportion of it was due to non-infectious causes.

Table I.

The following Table shows the egg production for each of the thirty-five tests held since 1912-13 :—

Test Period	No. of Birds	No. of Eggs Laid	Average Number per Bird
Forty-eight weeks ended :—			
31st Aug., 1913	318	38,199	120.1
„ 1914	282	39,216	139.0
„ 1915	264	39,764	150.6
„ 1916	294	49,830	169.5
„ 1917	210	36,660	174.6
„ 1918	210	36,106	171.9
„ 1919	306	55,124	180.0
„ 1920	354	65,840	186.0
„ 1921	288	51,584	179.0
9th Sept., 1922	342	63,518	185.7
16th „ 1923	198	38,519	194.5
15th „ 1924	342	61,144	178.8
15th „ 1925	348	63,755	183.2
15th „ 1926	342	65,187	190.4
16th „ 1927	492	93,912	190.9
16th „ 1928	510	95,226	186.7
16th „ 1929	540	101,820	188.6
16th „ 1930	588	100,752	171.3
16th „ 1931	588	111,180	189.1
15th „ 1932	600	111,986	186.6
12th „ 1933	606	113,047	186.5
10th „ 1934	606	112,177	185.1
7th „ 1935	702	131,384	187.1
3rd „ 1936	702	130,940	186.5
Forty-six weeks ended :—			
18th Aug., 1937	708	125,621	177.4
18th „ 1938	678	126,143	186.1
18th „ 1939	708	133,306	188.3
17th „ 1940	672	121,250	180.4
18th „ 1941	642	114,617	178.5
18th „ 1942	438	77,640	177.3
18th „ 1943	510	88,167	172.9
17th „ 1944	546	91,903	168.3
18th „ 1945	546	94,956	173.9
18th „ 1946	552	91,038	164.9
18th „ 1947	570	98,674	173.1

It should be noted that the figures given in Table I above are based on the total number of birds competing, no allowance having been made in respect of deaths.

Taking the birds which died during the 1946-47 test into account only up to the date of death, the average number of birds for the whole period was 539.1 and the average number of eggs per bird 183.0.

Table II.

Average Egg Yield for each Breed.

Breed	Number of Birds for full period	Number of Eggs Laid	Average Number of Eggs per Bird	Grade Averages per Bird: Special	First	Under First
White Wyandotte	123	24,206	196.8	132.2	55.4	9.2
Rhode Island Red ..	262	49,439	188.7	119.8	58.4	10.5
White Leghorn	41	7,447	181.6	90.6	76.5	14.5
Light Sussex	60	10,190	169.8	94.6	62.1	13.1
Buff Rock	10	1,521	152.1	91.0	52.9	8.2
All Breeds	496	92,803	187.1	116.8	59.5	10.8

Table III.

Average Egg Yield per Bird during each of the Twelve Periods.

Breed	Number of Birds for full period	Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Average for full period
White Wyandotte ...	123	14.6	17.0	17.1	17.0	17.8	18.4	20.5	19.4	17.3	16.4	15.0	6.3	196.8
Rhode Island Red ...	262	9.7	13.8	15.9	15.6	16.7	18.5	21.3	20.7	18.5	15.9	15.4	6.7	188.7
White Leghorn ...	41	13.5	12.7	13.4	13.7	15.5	16.7	19.9	19.6	17.9	15.7	15.5	7.5	181.6
Light Sussex ...	60	13.0	13.4	13.7	15.1	16.5	17.2	19.1	17.1	14.0	12.4	13.4	4.9	169.8
Buff Rock	10	6.5	11.0	16.3	14.1	18.0	14.7	17.7	15.9	11.0	13.0	9.4	4.5	152.1
All Breeds ...	496	11.6	14.4	15.7	15.7	16.9	18.1	20.7	19.7	17.5	15.5	14.9	6.4	187.1

TABLE IV.
Average Weight of Egg for each Breed.

BREED	Total Number of Eggs Laid	Total Weight of Eggs	Average Weight of Egg	Average Weight per dozen
		lb. oz. dr.	*oz. dr.*	*oz.*
White Wyandotte ..	26,178	3,714 1 13	2 4	27.2
Rhode Island Red ..	51,864	7,326 9 4	2 4	27.1
White Leghorn ..	7,985	1,098 0 11	2 3	26.4
Light Sussex	10,924	1,521 10 7	2 4	26.7
Buff Rock	1,723	244 10 7	2 4	27.3
All Breeds ..	98,674	13,905 0 10	2 4	27.1

TABLE V.
Number and Percentage of Special, First and under First Grade Eggs for each Breed in respect of Birds which completed the full 46-week Period.

BREED	EGGS LAID			PERCENTAGE DISTRIBUTION		
	Special Grade	First Grade	Under First Grade	Special Grade	First Grade	Under First Grade
				%	%	%
White Wyandotte ..	16,262	6,812	1,182	67.2	28.1	4.7
Rhode Island Red ..	31,372	15,309	2,758	63.4	31.0	5.6
White Leghorn ..	3,717	3,137	593	49.9	42.1	8.0
Light Sussex	5,678	3,724	788	55.7	36.6	7.7
Buff Rock	910	529	82	59.8	34.8	5.4
All Breeds ..	57,939	29,511	5,353	62.4	31.8	5.8

TABLE VI.

Number and Percentage of Birds which laid 200 Special and First Grade Eggs or over, and not more than twenty per cent. under First Grade.

BREED	Number of Birds for full Period	Number of Birds which laid 200 Special and First Grade Eggs or over	Percentage
			%
White Wyandotte	123	49	39.8
Rhode Island Red	262	90	34.4
White Leghorn	41	11	26.8
Light Sussex	60	9	15.0
Buff Rock	10	—	—
All Breeds	496	159	32.1

TABLE VII.

Number and Percentage of Birds which laid over 169 but less than 200 Special and First Grade Eggs and not more than 20 per cent. under First Grade. The figures are based on the number of birds which completed the Test.

BREED	Number of Birds	Percentage
		%
White Wyandotte	41	33.3
Rhode Island Red	76	29.0
White Leghorn	12	29.3
Light Sussex	19	31.7
Buff Rock	3	30.0
All Breeds	151	30.4

Table VIII.

Egg Records of Birds which were awarded Copper Rings.

White Wyandotte (43 Birds).

Pen Number	Bird Number	Number of Sealed Copper Ring	Eggs Laid: Special Grade	First Grade	Under First Grade	Total	Name and Address of Owner
1	3 4 6	2838 2839 2840	162 179 130	43 30 86	1 1 7	206 210 223	Mrs. M. Stanton, Woodlands, Glanmire, Co. Cork.
4	15	2841	217	3	1	221	Mr. V. E. H. Bewley, Danum Firs, Zion Road, Rathgar, Dublin.
7	19	2842	189	14	4	207	Miss V. Burdon, The Laurels, Buttevant, Co. Cork.
12	38	2843	144	87	6	237	Hon. Mrs. W. J. French, Croghan House, Boyle, Co. Roscommon.
13	46 47	2844 2845	161 126	54 91	6 23	221 240	Miss B. Quain, Anglesboro, *via Mitchelstown*, Co. Limerick.
16	63	2846	162	63	—	225	Sister-in-Charge, St. Martha's College, An Uaimh, Co. Meath.
17	69	2847	62	151	2	215	Mrs. M. Nagle, Springmount, Mallow, Co. Cork.
19	73 74	2848 2849	237 212	19 —	1 —	257 212	Mr. B. H. Roberts, Ballyanna, Ballycotton, Co. Cork.
21	85 86 88 89	2850 2851 2852 2853	186 211 235 180	88 — 9 23	15 — 2 2	289 211 246 205	Mrs. W. Coleman, Banada, Ballaghaderreen, Co. Roscommon.
22	91 94	2854 2855	140 198	72 14	10 4	222 216	Mr. J. Lynch, Cooldoney, Abbeylara, Streete P.O., Co. Longford.

Pen Number	Bird Number	Number of Sealed Copper Ring	Eggs Laid: Special Grade	Eggs Laid: First Grade	Eggs Laid: Under First Grade	Eggs Laid: Total	Name and Address of Owner
23	99	2856	105	107	28	240	Mr. W. Barron,
	102	2857	230	1	—	231	Woodview P.F.,
							Gurtrush,
							Piltown,
							Co. Kilkenny.
24	103	2858	151	69	2	222	Mrs. K. Ryan,
	105	2859	199	42	4	245	Farnane,
	106	2860	118	84	4	206	Lisnagry,
	108	2861	102	56	2	220	Co. Limerick.
25	109	2862	94	147	6	247	Mrs. M. Connolly,
	110	2863	243	2	--	245	Carrigamore,
	111	2864	181	51	—	232	Corvalley P.O.,
	112	2865	226	—	—	226	Co. Monaghan.
	113	2866	190	30	—	220	
26	115	2867	170	45	—	215	Mrs. C. Monahan,
	116	2868	166	75	1	242	Toor Cottage,
	118	2869	204	4	—	208	Ballinabrackey,
	119	2870	131	69	2	202	Hill of Down,
							Co. Meath.
27	121	2871	106	103	9	218	Miss J. Caslin,
	124	2872	161	39	7	207	Newtowncashel,
							Co. Longford.
28	128	2873	166	63	—	229	Miss M. O'Keeffe,
							Ballybooden,
							Knocktopher,
							Co. Kilkenny.
29	136	2874	190	43	2	235	Mrs. K. F. Graham,
	138	2875	202	25	—	227	Ballagh Lodge
							Donadea,
							Co. Kildare.
30	140	2876	36	189	26	251	Mrs. B. Coughlan,
							Ruane,
							Eyrecourt,
							Ballinasloe,
							Co. Galway.
31	146	2877	132	83	6	221	Mrs. T. Kelly,
	147	2878	207	33	1	241	Ballyskea,
	149	2879	198	17	1	216	Monivea P.O.,
	150	2880	136	66	4	206	Athenry,
							Co. Galway.

RHODE ISLAND RED (84 Birds).

Pen Number	Bird Number	Number of Sealed Copper Ring	Eggs Laid: Special Grade	Eggs Laid: First Grade	Eggs Laid: Under First Grade	Eggs Laid: Total	Name and Address of Owner
33	162	2881	211	1	—	212	Mrs. O. Hodgins, Roselawn, Cloughjordan, Co. Tipperary.
34	163 165 166	2882 2883 2884	105 32 76	103 186 138	16 35 8	224 253 222	Mrs. E. O'Donnell, Kilbreedy West, Kilmallock, Co. Limerick.
36	171	2885	162	75	11	248	Mr. D. H. Edwards, Drumgowan, Burt, Speenogue, Co. Donegal.
37	175 177 178 180	2886 2887 2888 2889	203 19 204 184	3 194 5 50	— 35 — 1	206 248 209 235	Mrs. M. J. Doyle, Carrigeen, Baltinglass, Co. Wicklow.
38	183 186	2890 2891	212 202	4 22	— 2	216 226	Mrs. B. McAuliffe, Farrihy, Broadford, *via Charleville*, Co. Limerick.
39	189	2892	128	91	3	222	Capt. H. M. S. Redmond, Popefield, Athy, Co. Kildare.
40	194 195 196 197 198	2893 2894 2895 2896 2897	65 71 32 168 73	165 131 176 40 135	16 6 26 1 3	246 208 234 209 211	Mrs. S. Harris, Athassel, Golden, Cashel, Co. Tipperary.
45	220	2898	140	70	—	210	Miss M. O'Donovan, Dromore, Villierstown, Cappoquin, Co. Waterford.
46	227	2899	195	30	5	230	Sister-in-Charge, Drishane Convent, Millstreet, Co. Cork.
48	244 245	2900 2901	107 185	105 74	14 —	226 259	Sister-in-Charge, St. Martha's College, An Uaimh, Co. Meath.
49	249	2902	45	181	11	237	Mrs. K. Earl, Grantstown House, Waterford.

Pen Number	Bird Number	Number of Sealed Copper Ring	Eggs Laid: Special Grade	First Grade	Under First Grade	Total	Name and Address of Owner
50	254	2903	197	38	7	242	Miss J. Weston, Ballymadrough, Donabate, Co. Dublin.
51	261	2904	218	15	2	235	Mr. M. Fitzgibbon, Gurrane, Kilmeedy, Co. Limerick.
52	265	2905	24	179	11	214	Mr. M. Fitzgibbon, Gurrane, Kilmeedy, Co. Limerick.
	267	2906	192	13	3	208	
	269	2907	228	3	1	232	
	270	2908	24	200	29	253	
53	280	2909	47	178	7	232	Rev. Bro. Dominick, Agricultural College, Mount Bellew, Co. Galway.
54	284	2910	87	134	14	235	Sister-in-Charge, School of Domestic Science, Dunmanway, Co. Cork.
	287	2911	171	51	5	227	
55	290	2912	218	3	—	221	Miss M. Mulcahy, Abbeyview, Clonmel, Co. Tipperary.
	291	2913	126	114	1	241	
	292	2914	220	1	—	221	
57	296	2915	193	13	—	206	Mrs. O. Hodgins, Roselawn, Cloughjordan, Co. Tipperary.
	297	2916	180	54	—	234	
	298	2917	158	69	1	228	
58	302	2918	204	18	1	223	Mrs. E. O'Donnell, Kilbreedy West, Kilmallock, Co. Limerick.
	303	2919	30	178	33	241	
60	313	2920	90	121	3	214	Mrs. M. A. Kelly, Carronstown, Ballivor, Co. Meath.
	314	2921	72	147	13	232	
	315	2922	45	186	12	243	
	316	2923	194	38	2	234	
61	320	2924	41	180	22	243	Eibhlín Bean Mhic Dhomhmaill, Imeall Átha, Baile an Fheirtéirigh, Co. Chiarraidhe.
63	332	2925	170	50	1	221	Mrs. B. McAuliffe, Farrihy, Broadford, *via Charleville*, Co. Limerick.
	335	2926	196	7	—	203	
	336	2927	95	106	3	204	

Pen Number	Bird Number	Number of Sealed Copper Ring	Eggs Laid				Name and Address of Owner
			Special Grade	First Grade	Under First Grade	Total	
64	337 340 341 342	2928 2929 2930 2931	209 83 213 184	2 141 2 22	— 8 — —	211 232 215 206	Capt. H. M. S. Redmond, Popefield, Athy, Co. Kildare.
66	352 353	2932 2933	62 114	196 101	7 —	265 215	Mrs. M. Kennedy, Kilderry House, Fedamore, Co. Limerick.
68	364	2934	121	137	5	263	Miss M. O'Donovan, Dromore, Villierstown, Cappoquin, Co. Waterford.
69	369 372	2935 2936	111 183	122 28	5 —	238 211	Mrs. C. Healy, Clonmeen, Banteer, Co. Cork.
71	379 381 382 383	2937 2938 2939 2940	204 154 171 167	5 67 41 56	4 — 4 2	213 221 216 225	Mrs. M. A. McNiece, Tomacrow, Drumacrib, Castleblayney, Co. Monaghan.
72	385 386 388 389	2941 2942 2943 2944	219 202 193 232	— 1 20 1	— — 1 —	219 203 214 233	Mrs. M. F. Smith, Bridge House, Bettystown, Co. Meath.
73	393 395	2945 2947	216 71	15 150	— 19	231 240	Mrs. S. Collier, Boggan, Kilbride, Tullow, Co. Carlow.
74	398 400 402	2948 2949 2950	197 123 124	52 125 88	— 4 15	249 252 227	Mrs. L. Hayes, Walshestown, Castlemahon, Newcastle West, Co. Limerick.
75	405	2951	212	1	—	213	Mrs. K. Sammon, Carrigahorig, Birr, Offaly.
76	409 410 411	2952 2953 2954	190 111 45	11 98 179	— 2 6	201 211 230	Miss C. Mealiff, Ballinamona House, Tullamore, Offaly.
77	416	2955	177	26	—	203	Mrs. M. C. McCormack, Bawnogues, Kilcock, Co. Kildare.

Pen Number	Bird Number	Number of Sealed Copper Ring	Eggs Laid: Special Grade	First Grade	Under First Grade	Total	Name and Address of Owner
79	427	2956	102	108	13	223	Mr. W. Murphy, Skeeter Park, Cleariestown, Co. Wexford.
80	433 437	2957 2958	181 153	49 57	3 —	233 210	Miss M. Mulcahy, Abbeyview, Clonmel, Co. Tipperary.
81	440	2959	20	180	24	224	Mrs. M. O'Reilly, St. Johnsfort, Ardee, Co. Meath.
82	445 446	2960 2961	66 96	163 118	25 35	254 249	Miss E. A. Bissett, The Matt, Delahasey, Co. Dublin.
83	451 455	2962 2963	28 87	185 147	11 2	224 236	Mrs. M. K. Murphy, Rockgrove, Belmont Park, Cork.
84	237 238	2964 2965	227 196	1 19	— 1	228 216	Mrs. J. Plunkett, Killeenmore, Killeigh, Offaly.

White Leghorn (10 Birds).

Pen Number	Bird Number	Number of Sealed Copper Ring	Eggs Laid: Special Grade	First Grade	Under First Grade	Total	Name and Address of Owner
85	546	1843	113	87	6	206	Mrs. L. Forster, Tattybrack, Rockcorry, Co. Monaghan.
86	552	1844	136	82	10	228	Sister-in-Charge, R.D.E. School, Swinford, Co. Mayo.
87	553 556	1845 1846	19 117	215 115	23 10	257 242	Mrs. M. O'Shea, Farrantane, Castlegregory, Co. Kerry.
88	560 564	1847 1848	54 143	163 73	22 15	239 231	Mrs. P. Walton, Ashtown Lodge, Castleknock, Co. Dublin.
89	566 568 569 570	1849 1850 1851 1852	126 110 203 71	87 91 32 146	3 2 1 19	216 203 236 236	Sister-in-Charge, St. Martha's College, An Uaimh, Co. Meath.

Light Sussex (7 Birds).

Pen Number	Bird Number	Number of Sealed Copper Ring	Eggs Laid: Special Grade	Eggs Laid: First Grade	Eggs Laid: Under First Grade	Eggs Laid: Total	Name and Address of Owner
104	470	2966	83	120	6	209	Mrs. W. O'Neill, Killeen House, Ballybricken, Grange, Kilmallock, Co. Limerick.
107	487	2967	37	168	13	218	Sister-in-Charge, St. Martha's College, An Uaimh, Co. Meath.
112	511	2968	100	116	—	216	Mrs. M. Comerford, Lamogue, Windgap, Thomastown, Co. Kilkenny.
	513	2969	165	51		216	
	514	2970	235	16	—	251	
	515	2971	180	39	—	219	
113	533	2972	83	139	8	230	Sister-in-Charge, St. Mary's Abbey, Glencairn, Co. Waterford.

Table IX.

Results of post-mortem examinations performed by the Veterinary College.

Date of Death	Number of Bird	Number of Pen	Breed	Result of Post-mortem Examination
1946				
Oct. 5	264	51	Rhode Island Red	Peritonitis.
„ 18	85	11	White Wyandotte	Leukaemia and nephritis.
„ 19	574	96	White Leghorn	Cause of death : accident.
„ 21	158	33	Rhode Island Red	Peritonitis
Nov. 5	444	81	Rhode Island Red	Lymphomatosis of the ovary.
„ 8	28	8	White Wyandotte	Congestion of the lungs and kidneys.
„ 20	454	83	Rhode Island Red	Lymphomatosis of the bowel and peritoneum.
„ 21	262	51	Rhode Island Red	Tapeworm infestation.
„ 22	90	21	White Wyandotte	Peritonitis.
Dec. 5	159	33	Rhode Island Red	Nephritis.
„ 11	425	78	Rhode Island Red	Lymphomatosis of the mesentry.
„ 12	526	116	Buff Rock	Impaction of the bowel.
„ 16	278	53	Rhode Island Red	Lymphomatosis of the ovary and caecal coccidiosis.
„ 17	84	20	White Wyandotte	Nephritis.
„ 21	204	41	Rhode Island Red	Lymphomatosis.
„ 21	257	50	Rhode Island Red	Impaction of the crop.
1947				
Jan. 4	225	46	Rhode Island Red	Sarcomatous growth on thigh.
„ 13	268	52	Rhode Island Red	Enteritis.
„ 13	366	68	Rhode Island Red	Peritonitis.
„ 23	209	43	Rhode Island Red	Jaundice with fatty liver.
„ 23	407	75	Rhode Island Red	Tuberculosis.
Feb. 3	8	2	White Wyandotte	Oviductitis.
„ 5	231	47	Rhode Island Red	Lymphomatosis of the ovary.
„ 5	323	61	Rhode Island Red	Lymphomatosis of the ovary.
„ 20	548	86	White Leghorn	Lymphomatosis and ascarid worm infestation.
„ 20	586	97	White Leghorn	Impaction of the bowel.
Mar. 5	497	109	Light Sussex	Peritonitis and oviductitis.
„ 10	188	39	Rhode Island Red	Leukaemia.
„ 15	277	53	Rhode Island Red	Lymphomatosis of the ovary.
„ 18	87	21	White Wyandotte	Peritonitis.
„ 19	331	63	Rhode Island Red	Peritonitis.
April 8	172	36	Rhode Island Red	Peritonitis and oviductitis.
„ 8	465	102	Light Sussex	Peritonitis and oviductitis.
„ 11	558	87	White Leghorn	Peritonitis.
„ 19	430	79	Rhode Island Red	Lymphomatosis of the ovary.
„ 23	23	7	White Wyandotte	Visceral gout.
„ 24	40	12	White Wyandotte	Neuro-lymphomatosis.
„ 28	343	65	Rhode Island Red	Tuberculosis.
May 1	81	20	White Wyandotte	Aspergillosis.
„ 12	82	11	White Wyandotte	Peritonitis.
„ 12	345	65	Rhode Island Red	Tuberculosis.
„ 14	588	97	White Leghorn	Capillaria and ascarid worm infestation.
„ 16	339	64	Rhode Island Red	Peritonitis.
„ 19	80	20	White Wyandotte	Ulceration of the caecal tubes.
„ 22	31	11	White Wyandotte	Peritonitis.
„ 23	480	105	Light Sussex	Peritonitis.
„ 24	406	75	Rhode Island Red	Neuro-lymphomatosis.

TABLE IX.—*continued.*

Date of Death	Number of Bird	Number of Pen	Breed	Result of Post-mortem Examination
June 2	203	41	Rhode Island Red	Rupture of a fatty liver.
,, 2	827	62	Rhode Island Red	Rupture of a blood-vessel in the liver.
,, 5	504	110	Light Sussex	Nephritis.
,, 9	61	16	White Wyandotte	Peritonitis.
,, 9	876	70	Rhode Island Red	Peritonitis.
,, 12	12	2	White Wyandotte	Visceral gout.
,, 28	222	45	Rhode Island Red	Rupture of a fatty liver.
July 1	199	41	Rhode Island Red	Peritonitis.
,, 2	403	75	Rhode Island Red	Peritonitis and congestion of the lungs.
,, 4	44	13	White Wyandotte	Lymphomatosis of the ovary and mesentry.
,, 5	14	4	White Wyandotte	Peritonitis.
,, 7	310	59	Rhode Island Red	Peritonitis.
,, 10	7	2	White Wyandotte	Congestion of the lungs and fatty liver.
,, 10	256	50	Rhode Island Red	Peritonitis.
,, 14	583	97	White Leghorn	Peritonitis.
,, 16	132	28	White Wyandotte	Peritonitis.
,, 17	250	49	Rhode Island Red	Lymphomatosis of the heart and mesentry.
,, 19	525	116	Buff Rock	Tuberculosis.
,, 26	429	79	Rhode Island Red	Lesions of fowl paralysis.
,, 28	230	47	Rhode Island Red	Lesions of Tuberculosis.
Aug. 2	154	32	Rhode Island Red	Peritonitis.
,, 7	18	4	White Wyandotte	Peritonitis.
,, 7	591	98	White Leghorn	General debility.
,, 8	461	101	Light Sussex	Peritonitis.
,, 9	48	13	White Wyandotte	Tapeworm and capillaria worm infestation.
,, 14	1	1	White Wyandotte	Prolapse of the bowel.
,, 15	490	107	Light Sussex	Peritonitis.

Table X.

Number and Percentage of Deaths for each Breed.

Breed	Number of Birds Penned	Number of Deaths	Percentage of Deaths
			%
White Wyandotte	144	21	14.6
Rhode Island Red	300	38	12.7
White Leghorn	48	7	14.6
Light Sussex	66	6	9.1
Buff Rock	12	2	16.7
All Breeds	570	74	13.0

SECTION PRIZES.

Section I—White Wyandotte.

Owner of Pen	Scoring Points	Special and First Grade Scoring Eggs
First Prize (£10) : Mrs. M. Stanton, Woodlands, Glanmire, Co. Cork.	2,906	1,193
Second Prize (£7) : Mr. B. H. Roberts, Ballyanna, Ballycotton, Co. Cork.	2,823	1,166
Third Prize (£5) : Mrs. M. Nagle, Springmount, Mallow, Co. Cork.	2,596	1,092
Fourth Prize (£4) : Sister-in-Charge, St. Mary's Domestic Science School, Dunmanway, Co. Cork.	2,500	1,015
Fifth Prize (£2) : Hon. Mrs. W. J. French, Croghan House, Boyle, Co. Roscommon.	2,449	997

Section II—White Wyandotte (Station Holders)

	Owner of Pen	Scoring Points	Special and First Grade Scoring Eggs
First Prize (£10) :	Mrs. M. Connolly, Carrigamore, Corvally P.O., Co. Monaghan.	3,234	1,320
Second Prize (£7) :	Mrs. T. Kelly, Ballyskea, Monivea P.O., Athenry, Co. Galway.	3,062	1,262
Third Prize (£5) :	Mrs. B. Coughlan, Ruane, Eyrecourt, Ballinasloe, Co. Galway.	2,986	1,221
Fourth Prize (£4) :	Mrs. C. Monahan, Toor Cottage, Ballinabrackey, Hill of Down, Co. Meath.	2,974	1,225
Fifth Prize (£2) :	Mrs. K. Ryan, Farnane, Lisnagry, Co. Limerick.	2,929	1,200

Section III—Rhode Island Red.

	Owner of Pen	Scoring Points	Special and First Grade Scoring Eggs
First Prize (£10) :	Mrs. E. O'Donnell, Kilbreedy West, Kilmallock, Co. Limerick.	3,108	1,278
Second Prize (£7) :	Mrs. M. J. Doyle, Carrigeen, Baltinglass, Co. Wicklow.	3,018	1,246
Third Prize (£5) :	Mrs. S. Harris, Athassel, Golden, Cashel, Co. Tipperary.	2,989	1,239
Fourth Prize (£4) :	Miss M. Mulcahy, Abbeyview, Clonmel, Co. Tipperary.	2,808	1,165
Fifth Prize (£2) :	Sister-in-Charge, St. Martha's College, An Uaimh, Co. Meath.	2,612	1,081

Section IV—Rhode Island Red (Station Holders).

	Owner of Pen	Scoring Points	Special and First Grade Scoring Eggs
First Prize (£10):	Mrs. M. F. Smith, Bridge House, Bettystown, Co. Meath.	3,074	1,264
Second Prize (£7):	Mrs. M. A. Kelly, Carronstown, Ballivor, Co. Meath.	2,959	1,223
Third Prize (£5):	Mrs. O. Hodgins, Roselawn, Cloughjordan, Co. Tipperary.	2,909	1,215
Fourth Prize (£4):	Miss C. Mealiff, Ballinamona House, Tullamore, Offaly.	2,847	1,181
Fifth Prize (£2):	Mrs. E. O'Donnell, Kilbreedy-West, Kilmallock, Co. Limerick.	2,801	1,160

Section V—Any Non-Sitting Breed.

	Owner of Pen	Breed	Scoring Points	Special and First Grade Scoring Eggs
First Prize (£10):	Mrs. P. Walton, Ashtown Lodge, Castleknock, Co. Dublin.	White Leghorn	2,763	1,169
Second Prize (£7):	Sister-in-Charge, St. Martha's College, An Uaimh, Co. Meath.	do.	2,705	1,089
Third Prize (£5):	Mrs. M. O'Shea, Farrantane, Castlegregory, Co. Kerry.	do.	2,522	1,048
Fourth Prize (£4):	Mrs. M. E. Shanley, Drumard, Dromod P.O., Co. Leitrim.	do.	2,474	1,010
Fifth Prize (£2):	Mrs. L. Forster, Tattybrack, Rockcorry, Co. Monaghan.	do.	2,266	947

Section VI—Any Other Utility Breed.

	Owner of Pen	Breed	Scoring Points	Special and First Grade Scoring Eggs
First Prize (£10) :	Mrs. M. Comerford, Lamogue, Windgap, Thomastown, Co. Kilkenny.	Light Sussex	2,570	1,050
Second Prize (£7) :	Sister-in-Charge, St. Mary's Abbey, Glencairn, Co. Waterford.	do.	2,524	1,039
Third Prize (£5) :	Sister-in-Charge, St. Martha's College, An Uaimh, Co. Meath.	do.	2,458	1,033
Fourth Prize (£4) :	Mrs. W. O'Neill, Killeen House, Ballybricken, Grange, Kilmallock, Co. Limerick.	do.	2,449	992
Fifth Prize (£2) :	Miss M. Brett, Kylenahone, Killenaule, Thurles, Co. Tipperary.	do.	2,267	980

SPECIAL PRIZES.

The Special Prize of a Silver Cup (or its value, £10) for the *Pen* of birds scoring the highest number of points during the Test has been awarded to Mrs. M. Connolly, Carrigamore, Corvalley P.O., Co. Monaghan, for Pen No. 25 (White Wyandotte) which scored 3,234 points.

Special Prizes of £2 each have been awarded to the following owners :—

1. Mrs. K. Ryan, Farnane, Lisnagry, Co. Limerick, for the sitting breed, Pen No. 24 (White Wyandotte) which scored 1,080 points during the period 1st October to 23rd December.

2. Sister-in-Charge, St. Martha's College, An Uaimh, Co. Meath, for the non-sitting breed, Pen No. 89 (White Leghorn) which scored 825 points during the period 1st October to 23rd December.

3. Mrs. M. Kennedy, Kilderry House, Fedamore, Co. Limerick, for the *individual* sitting breed bird, No. 352 (Pen No. 66—Rhode Island Red) which scored 624 points during the test.

4. Sister-in-Charge, St. Martha's College, An Uaimh, Co. Meath, for the *individual* non-sitting breed bird, No. 569 (Pen No. 89—White Leghorn) which scored 586 points during the test.

5. Mrs. M. A. McNiece, Tomacrow, Drumacrib, Castleblayney, Co. Monaghan, for the *individual* sitting breed bird, No. 381 (Pen No. 71, Rhode Island Red) which scored 284 points during the period 1st October to 23rd December.

6. Sister-in-Charge, St. Martha's College, An Uaimh, Co. Meath, for the *individual* non-sitting breed bird, No. 569 (Pen No. 89, White Leghorn) which scored 189 points during the period 1st October to 23rd December.

SECTION I.—WHITE WYANDOTTE—12 Pens.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1946	No. of Bird	Weight: On Arrival (lb. oz.)	Weight: At Close of Test (lb. oz.)	Oct. 1-Oct. 28	Oct. 29-Nov. 25	Nov. 26-Dec. 23	Dec. 24-Jan. 20	Jan. 21-Feb. 17	Feb. 18-Mar. 17	Mar. 18-Apl. 14	Apl. 15-May 12	May 18-June 9	June 10-July 7	July 8-Aug 4	Aug. 5-Aug. 18	Total	Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First-Grade	Special and First Grade—Oct. 1-Dec. 28	Scoring Points: Oct. 1-Dec. 23	Scoring Points: Full Period	Average Weight of Eggs (oz. dr.)	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
1	1	Mrs. M. Stanton,	Feb. 6	1	6 6	D	20	16	17	17	18	21	22	19	18	20	13	D3	204	201	3	—	—	53	159	497	2 8	—	(a) 1,204 Eggs
		Woodlands,	,, 6	2	6 13	7 4	9	13	18	16	19	17	19	16	18	19	19	8	191	182	7	2	—	38	114	462	2 6	—	
		Glanmire,	,, 18	3	6 4	7 0	19	19	16	19	18	19	18	19	15	17	18	9	206	162	43	1	—	53	159	507	2 5	—	(b) 28.7 oz.
		Co. Cork.	Jan. 11	4	6 11	6 6	16	6	20	20	19	21	22	17	15	24	21	9	210	179	30	1	—	41	123	513	2 5	—	
			,, 11	5	6 14	6 12	—	—	9	19	21	18	20	18	20	20	18	7	170	170	—	—	—	9	27	394	2 11	—	(c) 2,906 Points
			,, 28	6	5 7	6 3	10	23	19	18	17	17	22	21	21	21	23	11	223	130	86	7	—	46	138	533	2 3	—	
2	19	Mr. B. H. Roberts,	Mar. 12	73	6 4	7 6	24	25	25	21	24	22	26	22	22	20	16	10	257	237	19	1	4	73	216	619	2 6	—	(a) 1,191 Eggs
		Ballyanna,	,,	74	7 6	7 4	—	22	21	17	19	19	23	21	19	22	19	10	212	212	—	—	—	43	129	518	2 7	—	
		Ballycotton,	Feb. 14	75	6 8	6 8	—	—	—	15	19	18	20	19	24	19	12	—	146	141	4	1	1	—	—	319	2 7	—	(b) 28.5 oz.
		Co. Cork.	,,	76	5 8	6 12	21	21	12	3	21	17	24	24	22	16	17	5	203	185	14	4	1	50	147	483	2 7	—	
			Jan. 22	77	6 8	6 15	23	20	4	—	4	22	17	25	21	21	22	7	186	157	28	1	—	46	138	466	2 5	—	(c) 2,823 Points
			Mar. 12	78	6 9	6 8	14	15	21	21	23	9	17	20	24	8	15	—	187	159	23	5	7	45	135	418	2 5	2	
3	17	Mrs. M. Nagle,	February	67	5 4	6 2	25	26	22	18	20	19	23	26	15	3	—	—	197	14	96	87	—	16	48	239	2 0	—	(a) 1,273 Eggs
		Springmount,	,,	68	4 12	4 12	25	22	23	19	22	16	23	21	22	20	20	10	243	135	105	3	—	68	204	598	2 3	—	
		Mallow,	,,	69	5 6	5 5	—	1	23	24	23	24	26	24	21	21	20	8	215	62	151	2	1	24	72	496	2 3	—	(b) 25.5 oz.
		Co. Cork.	,,	70	5 1	5 12	21	22	21	21	21	21	19	20	18	12	6	—	202	94	104	4	—	62	186	476	2 3	—	
			,,	71	5 5	6 8	22	23	21	19	20	21	21	18	7	2	—	—	174	74	85	15	—	53	159	373	2 2	—	(c) 2,596 Points
			,,	72	5 8	5 13	23	19	20	20	22	22	24	23	20	23	18	8	242	40	134	68	1	20	60	414	2 1	—	
4	15	Sister-in-Charge,	February	55	5 10	6 11	17	19	21	10	12	14	16	13	11	8	11	—	152	45	84	23	44	37	111	218	2 2	—	(a) 1,169 Eggs
		St. Mary's	,,	56	5 7	5 12	24	25	20	16	19	22	23	26	20	17	15	8	235	29	174	32	3	56	168	484	2 1	—	
		Domestic Science	,,	57	5 0	6 6	23	23	23	20	18	19	20	17	16	10	11	6	206	141	57	8	—	61	183	484	2 4	—	(b) 26.0 oz.
		School,	,,	58	5 14	7 6	22	20	17	18	15	17	17	17	12	15	16	8	194	172	15	7	—	52	156	465	2 5	—	
		Dunmanway,	,,	59	5 6	5 10	20	23	25	19	20	20	20	24	18	8	2	—	199	31	154	14	2	55	165	430	2 2	—	(c) 2,500 Points
		Co. Cork.	,,	60	4 10	5 4	21	23	16	7	11	8	24	23	5	18	17	10	183	45	118	20	1	54	162	419	2 2	2	
5	12	Hon. Mrs. W. J. French,	March 15	37	5 3	7 15	13	19	16	19	1	17	20	19	20	14	12	5	175	169	6	—	1	48	144	427	2 7	—	(a) 1,022 Eggs
		Croghan House,	,,	38	4 10	5 7	20	23	24	18	17	23	21	22	22	20	22	5	237	144	87	6	2	62	183	566	2 3	—	
		Boyle,	,,	39	5 0	7 0	24	10	—	10	20	21	23	22	18	18	18	6	190	64	116	10	1	28	84	427	2 2	—	(b) 27.5 oz.
		Co. Roscommon.	,,	40	5 4	D	9	17	20	4	6	7	—	D	—	—	—	—	63	40	21	2	—	44	132	166	2 3	—	
			,,	41	5 0	7 7	7	20	20	16	18	15	16	11	14	16	10	6	169	157	11	1	—	46	138	414	2 6	—	(c) 2,449 Points
			,,	42	5 11	7 14	25	12	—	18	19	20	23	21	9	24	5	12	188	157	29	2	—	36	108	449	2 6	1	

D = Dead.

SECTION I.—WHITE WYANDOTTE—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1946	No. of Bird	Weight: On Arrival lb. oz.	Weight: At Close of Test lb. oz.	Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First-Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Scoring Points: Full Period	Average Weight of Eggs oz. dr.	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
6	13	Miss B. Quain,	Feb. 24	43	5 6	6 0	15	20	18	8	18	17	20	21	19	15	12	6	189	163	18	8	—	45	135	440	2 5	—	(a) 1,091 Eggs
		Anglesboro,	,,	44	5 10	D	22	25	15	12	18	22	23	10	—	D	—	—	147	16	97	34	—	36	108	262	2 0	—	
		via Mitchelstown,	,,	45	6 1	6 10	—	7	20	21	18	23	25	22	12	15	16	—	179	117	60	2	—	25	75	410	2 4	2	(b) 26.5 oz.
		Co. Limerick.	,,	46	6 0	6 12	18	22	18	22	20	22	19	24	16	23	14	3	221	161	54	6	2	52	156	516	2 4	—	
			,,	47	5 6	6 0	23	22	11	18	23	22	24	26	21	21	20	9	240	126	91	23	—	36	108	520	2 3	—	(c) 2,407 Points
			,,	48	5 7	D	11	18	14	13	13	16	15	13	2	—	—	D	115	46	66	3	3	41	123	259	2 2	—	
7	4	Mr. V. E. H. Bewley,	Feb. 12	13	5 10	D	—	16	18	2	15	21	24	11	5	14	3	D	129	113	16	—	1	34	102	307	2 5	—	(a) 995 Eggs
		Danum Firs	,,	14	5 0	D	9	22	21	9	12	17	13	12	—	D1	—	—	116	91	21	4	7	48	144	258	2 4	—	
		Zion Road,	,,	15	5 6	6 4	21	20	20	15	19	18	22	20	19	17	23	7	221	217	3	1	—	60	180	547	2 7	—	(b) 28.4 oz.
		Rathgar,	,,	16	5 4	6 1	17	21	19	7	18	21	16	16	12	17	8	8	180	176	4	—	—	57	171	450	2 7	—	
		Dublin.	March 9	17	4 8	5 14	7	20	20	10	20	18	22	21	19	12	21	10	200	156	41	3	1	44	132	478	2 5	—	(c) 2,390 Points
			April 15	18	4 8	5 15	—	5	16	5	17	22	19	16	14	17	14	4	149	132	17	—	2	21	63	350	2 5	—	
8	2	Mrs. M. Stanton,	Feb. 18	7	7 10	D	18	22	20	20	20	20	23	22	22	13	D	—	200	186	13	1	1	59	177	467	2 5	—	(a) 976 Eggs
		Woodlands,	,, 6	8	6 11	D	18	19	18	2	D4	—	—	—	—	—	—	—	61	58	3	–	—	55	165	177	2 5	—	
		Glanmire,	,, 18	9	5 12	6 5	21	22	20	—	3	21	24	22	21	22	26	9	211	82	107	22	1	46	138	476	2 2	—	(b) 27.8 oz.
		Co. Cork.	,, 18	10	6 4	5 0	20	20	17	16	12	13	19	20	13	19	3	—	172	162	10	—	—	57	171	423	2 6	1	
			,, 1	11	7 14	8 7	15	18	22	18	2	—	22	21	16	17	17	5	173	170	3	—	2	55	165	434	2 8	1	(c) 2,351 Points
			,, 18	12	6 7	D	21	23	19	20	20	14	14	20	8	D	—	—	159	138	19	2	1	62	186	374	2 5	—	
9	16	Sister-in-Charge,	Jan. 10	61	6 7	D	20	22	17	16	1	—	12	10	D	—	—	—	98	25	60	13	—	55	165	225	2 1	—	(a) 916 Eggs
		St. Martha's College,	,, 22	62	5 14	5 3	17	13	7	17	8	5	21	13	14	18	5	—	138	108	30	—	—	37	111	336	2 4	—	
		An Uaimh,	Feb. 1	63	5 4	5 12	3	24	23	19	21	21	23	20	25	23	14	9	225	162	63	—	1	50	150	543	2 4	—	(b) 26.4 oz.
		Co. Meath	Jan. 22	64	4 15	6 7	24	21	22	20	11	—	—	—	—	—	—	—	98	6	78	14	—	59	177	227	2 0	—	
			,, 22	65	4 10	5 4	—	—	18	21	20	22	13	14	15	20	19	4	166	46	118	2	2	18	54	382	2 2	—	(c) 2,147 Points
			,, 10	66	5 5	6 3	—	—	16	22	22	22	24	24	23	19	7	12	191	145	45	1	—	16	48	434	2 4	1	
10	7	Miss V. Burdon,	Feb. 21	19	5 8	7 0	14	20	17	15	19	18	19	23	20	20	13	9	207	189	14	4	—	47	141	495	2 5	—	(a) 955 Eggs
		The Laurels,	,,	20	5 3	5 1	—	—	20	22	24	22	26	14	4	—	6	—	138	—	60	78	1	14	42	132	1 15	—	
		Buttevant,	,,	21	5 6	6 9	—	10	20	21	17	20	24	25	11	17	19	—	184	164	20	—	—	30	90	434	2 5	2	(b) 26.2 oz.
		Co. Cork.	,,	22	6 12	7 4	11	9	12	21	20	21	21	21	23	22	19	9	209	130	62	17	—	17	51	451	2 4	—	
			,,	23	5 6	D	6	15	4	12	15	17	17	D4	—	—	—	—	90	8	69	13	—	16	48	170	2 1	—	(c) 1,897 Points
			,,	24	6 0	5 14	—	—	7	18	19	5	24	11	16	9	15	3	127	16	79	32	—	5	15	215	2 1	—	

D = Dead.

SECTION I.—WHITE WYANDOTTE—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1946	No. of Bird	Weight: On Arrival (lb. oz.)	Weight: At Close of Test (lb. oz.)	Production per Period: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs (oz. dr.)	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
11	8	Mrs. M. J. Smith,	Feb. 15	25	5 4	4 14	—	—	4	19	23	20	19	18	5	2	—	—	110	37	69	4	—	3	9	217	2 3	—	(a) 711 Eggs
		Colmanstown,	,,	26	5 9	6 10	13	20	19	19	15	16	16	19	19	17	18	9	200	168	31	1	—	51	153	493	2 5	—	
		Ballinasloe,	March 18	27	5 5	4 4	—	—	—	—	—	5	20	13	13	9	—	—	60	57	3	—	2	—	—	124	2 7	—	(b) 26.9 oz.
		Co. Galway	,,	28	5 15	D	—	D	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
			,, 31	29	5 5	6 8	21	15	—	8	18	23	23	24	18	15	14	12	191	123	62	6	—	30	90	441	2 4	1	(c) 1,614 Points
			,, 18	30	5 14	7 4	20	22	21	19	16	17	15	10	4	—	6	—	150	69	71	10	—	53	159	339	2 3	—	
12	11	Mrs. M. J. Smith,	March 1	31	5 5	D	16	19	20	13	—	—	4	17	D4	—	—	—	93	61	29	3	1	52	156	230	2 4	—	(a) 646 Eggs
		Colmanstown	Feb. 15	32	5 14	D	—	—	—	4	22	21	20	d16	—	—	—	—	83	75	8	—	7	—	—	152	2 6	—	
		Ballinasloe,	,,	33	5 8	6 5	—	—	11	19	18	23	22	21	10	10	22	11	167	153	14	—	—	11	33	388	2 6	1	(b) 26.5 oz.
		Co. Galway.	March 18	34	5 14	6 4	—	—	17	19	22	20	19	21	19	8	15	3	163	52	102	9	—	11	33	345	2 2	1	
			,, 31	35	4 10	D	D	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	(c) 1,231 Points
			,, 18	36	4 12	6 0	—	—	12	20	21	20	23	13	4	13	10	4	140	—	55	85	—	4	12	116	1 15	3	

D = Dead.

SECTION II.—WHITE WYANDOTTE (STATION HOLDERS)—12 Pens.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1946	No. of Bird	Weight: On Arrival (lb. oz.)	Weight: At Close of Test (lb. oz.)	Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	Grading: First Grade	Grading: Under First Grade	Grading: Non-Scoring, Special and First Grade	Grading: Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Scoring Points: Full Period	Average Weight of Eggs (oz. dr.)	Number of times Broody	(a) Total Eggs from Pen (b) Average Weight per dozen. (c) Scoring Points per Pen.
1	25	Mrs. M. Connolly,	Feb. 1	109	5 9	6 8	18	22	20	20	21	19	25	22	24	24	24	8	247	94	147	6	—	56	168	594	2 2	—	(a) 1,389 Eggs
		Carrigamore,	,,	110	5 4	6 4	22	22	20	22	18	22	23	23	23	22	18	10	245	243	2	—	—	64	192	604	2 6	—	
		Corvalley P.O.,	,,	111	5 9	6 12	22	16	15	17	19	21	22	24	25	20	23	8	232	181	51	—	—	53	159	568	2 4	—	(b) 27.5 oz.
		Co. Monaghan.	,,	112	5 13	7 4	16	23	14	18	17	17	24	24	21	21	22	9	226	226	—	—	—	53	159	557	2 10	—	
			,,	113	6 3	7 10	24	21	16	17	18	19	20	20	17	19	20	9	220	190	30	—	—	61	183	549	2 5	—	(c) 3,234 Points
			,,	114	4 10	5 6	22	21	19	21	19	21	21	23	14	16	20	2	219	9	147	63	—	19	57	362	2 0	3	
2	31	Mrs. T. Kelly,	Feb. 3	145	4 11	7 11	12	17	20	20	18	20	17	14	19	17	15	6	195	172	22	1	—	48	144	474	2 5	—	(a) 1,299 Eggs
		Ballyskea,	,,	146	4 10	6 6	14	23	20	19	18	21	22	21	15	15	22	11	221	132	83	6	—	51	153	529	2 3	—	
		Monivea P.O.,	,,	147	4 12	7 8	21	27	22	22	23	22	22	22	18	21	15	6	241	207	33	1	—	70	210	592	2 6	—	(b) 27.1 oz.
		Athenry,	,,	148	4 8	6 0	4	25	21	17	18	18	20	24	25	20	20	8	220	47	149	24	—	31	93	471	2 2	—	
		Co. Galway.	,,	149	4 8	7 3	—	19	23	20	20	21	21	23	24	21	17	7	216	198	17	1	—	41	123	516	2 5	—	(c) 3,062 Points
			,,	150	4 8	6 10	13	20	22	18	21	17	23	24	24	15	9	—	206	136	66	4	—	52	156	480	2 4	—	
3	30	Mrs. B. Coughlan,	Feb. 4	139	4 8	6 4	2	21	21	21	22	18	23	21	20	23	23	8	223	142	78	3	—	41	123	535	2 4	—	(a) 1,324 Eggs
		Ruane,	,,	140	4 8	5 5	22	22	25	21	16	19	22	25	24	23	22	10	251	36	189	26	—	57	171	532	2 1	—	
		Eyrecourt,	,,	141	5 6	6 12	19	22	20	21	19	—	12	27	25	20	20	7	212	185	26	1	1	61	183	527	2 5	—	(b) 26.1 oz.
		Ballinasloe,	,,	142	5 4	7 3	13	25	15	17	17	14	23	21	23	18	24	3	213	128	84	1	3	53	159	516	2 4	—	
		Co. Galway	,,	143	4 14	6 8	5	23	21	22	23	21	18	4	21	16	11	5	190	71	109	10	3	41	123	426	2 3	—	(c) 2,986 Points
			,,	144	4 11	5 8	17	24	18	21	19	18	21	23	23	21	19	11	235	22	161	52	3	22	66	430	2 1	—	
4	26	Mrs. C. Monahan,	January	115	5 3	5 10	25	14	17	21	21	22	25	14	14	14	18	10	215	170	45	—	—	56	168	528	2 5	4	(a) 1,255 Eggs
		Toor Cottage,	,,	116	4 11	6 7	21	21	22	23	21	21	23	21	19	21	21	8	242	166	75	1	—	63	189	595	2 4	—	
		Ballinabrackey,	February	117	4 10	7 5	8	28	23	14	23	20	20	16	9	14	11	3	189	187	1	1	23	58	174	400	2 8	—	(b) 28.0 oz.
		Hill of Down,	,,	118	4 14	7 4	—	—	16	20	23	23	27	23	17	23	24	12	208	204	4	—	2	16	48	485	2 7	—	
		Co. Meath.	January	119	4 10	6 7	21	18	18	5	6	20	20	21	21	22	20	10	202	131	69	2	1	55	165	504	2 4	—	(c) 2,974 Points
			February	120	4 8	5 15	—	—	6	17	21	24	24	25	24	23	24	11	199	180	19	—	—	6	18	462	2 5	—	
5	24	Mrs. K. Ryan,	Jan. 15	103	5 9	7 10	13	20	19	22	18	20	20	19	23	20	20	8	222	151	69	2	—	50	150	538	2 4	—	(a) 1,221 Eggs
		Farnane,	,,	104	5 2	6 10	22	24	21	17	18	15	10	8	—	3	—	1	139	124	14	1	3	66	198	337	2 5	—	
		Lisnagry,	,,	105	5 3	6 2	23	23	22	20	18	22	23	24	23	20	17	10	245	199	42	4	1	64	192	591	2 5	—	(b) 27.2 oz.
		Co. Limerick.	,,	106	5 4	7 4	20	19	18	20	25	19	21	21	20	13	5	5	206	118	84	4	1	53	156	477	2 3	—	
			,,	107	5 8	6 4	20	19	13	—	16	22	25	21	20	14	14	5	189	152	37	—	3	52	156	456	2 4	—	(c) 2,929 Points
			,,	108	5 4	6 10	27	27	24	21	20	20	21	23	19	11	7	—	220	162	56	2	—	76	228	530	2 4	—	

SECTION II.—WHITE WYANDOTTE (STATION HOLDERS)—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1946	No. of Bird	Weight On Arrival lb.	Weight On Arrival oz.	Weight At Close of Test lb.	Weight At Close of Test oz.	Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points Oct. 1–Dec. 23	Scoring Points Full Period	Average Weight of Eggs oz.	Average Weight of Eggs dr.	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
6	22	Mr. J. Lynch,	March 19	91	4	12	5	10	16	21	21	22	19	20	20	20	21	22	11	9	222	140	72	10	—	48	144	514	2	4	1	(a) 1,304 Eggs
		Cooldoney,	,,	92	4	14	5	15	1	—	—	16	21	23	23	23	24	21	24	12	188	183	5	—	—	1	3	434	2	7	—	(b) 27.9 oz.
		Abbeylara,	,,	93	4	8	6	12	19	23	23	20	19	20	25	25	24	25	24	8	255	31	152	72	—	13	39	436	2	0	—	(c) 2,909 Points
		(Streete P.O.),	,,	94	4	8	6	3	22	22	18	21	18	19	19	21	20	16	12	8	216	198	14	4	—	58	174	518	2	7	—	
		Co. Longford.	,,	95	5	8	7	2	23	22	18	20	17	19	21	22	21	21	20	10	234	226	5	3	—	60	180	573	2	8	—	
			,,	96	5	9	8	1	—	—	—	13	20	20	25	27	24	24	24	12	189	171	16	2	—	—	—	434	2	6	—	
7	29	Mrs. K. F. Graham,	March 3	133	4	14	6	0	21	22	21	18	22	18	19	9	13	15	12	5	195	91	92	12	19	52	156	399	2	3	—	(a) 1,225 Eggs
		Ballagh Lodge,	,,	134	4	10	6	10	15	23	19	7	7	17	23	24	20	16	8	1	180	95	82	3	—	54	162	433	2	3	—	(b) 27.0 oz.
		Donadea,	,,	135	4	10	6	8	15	17	14	14	15	17	19	18	18	17	15	7	186	16	148	22	—	33	99	399	2	1	—	(c) 2,820 Points
		Co. Kildare.	,,	136	4	8	5	12	17	22	18	16	20	20	25	25	22	20	21	9	235	190	43	2	2	56	168	566	2	6	—	
			,,	137	4	8	6	8	21	19	9	—	23	22	23	24	22	18	16	5	202	141	52	9	2	40	120	460	2	4	—	
			,,	138	5	4	7	9	18	20	17	18	19	22	23	24	12	22	20	12	227	202	25	—	—	55	165	563	2	6	1	
8	27	Miss J. Caslin,	Feb. 27	121	5	12	8	4	15	20	14	18	18	19	20	23	19	20	21	11	218	106	103	9	1	40	120	508	2	3	—	(a) 1,187 Eggs
		Newtowncashel,	,,	122	4	8	6	8	—	18	22	18	15	20	21	20	21	22	18	7	202	110	89	3	—	37	111	482	2	4	—	(b) 26.8 oz.
		Co. Longford.	,,	123	4	12	7	0	10	19	20	9	8	13	22	22	12	15	17	5	172	48	109	15	1	44	132	392	2	2	—	(c) 2,809 Points
			,,	124	5	0	7	0	17	17	18	17	17	16	19	17	17	22	22	8	207	161	39	7	—	45	135	497	2	5	—	
			,,	125	4	15	6	8	1	23	20	18	20	20	21	15	19	10	14	10	191	155	35	1	—	43	129	457	2	4	3	
			,,	126	5	0	7	12	15	20	17	18	18	19	19	17	15	16	14	9	197	136	58	3	1	49	147	473	2	4	—	
9	23	Mr. W. Barron,	Feb. 6	97	5	2	8	1	21	21	19	20	13	12	4	—	—	7	8	—	125	123	2	—	2	61	183	322	2	7	—	(a) 1,125 Eggs
		Woodview P.F.,	,,	98	6	1	7	7	20	19	19	17	18	19	21	21	17	17	14	8	210	142	57	11	1	47	141	482	2	4	—	(b) 28.5 oz.
		Gurtrush,	March 7	99	5	7	6	12	26	25	24	25	20	21	24	21	20	14	12	8	240	105	107	28	2	51	153	508	2	3	—	(c) 2,505 Points
		Piltown,	,,	100	5	5	7	1	—	—	9	16	21	20	24	23	25	23	24	11	196	176	13	7	1	3	6	436	2	8	—	
		Co. Kilkenny.	,,	101	6	7	9	7	18	9	5	17	19	17	17	15	6	—	—	—	123	112	11	—	36	32	93	205	2	6	—	
			,,	102	6	0	8	8	23	23	22	22	21	23	22	20	20	16	12	7	231	230	1	—	3	68	204	557	2	9	—	
10	28	Miss M. O'Keeffe,	March 2	127	5	10	7	7	21	19	18	20	18	17	14	14	10	9	12	6	178	94	70	14	—	44	132	399	2	3	—	(a) 995 Eggs
		Ballybooden,	,,	128	5	10	6	10	17	14	22	20	19	22	23	20	20	24	18	10	229	166	63	—	13	53	159	524	2	4	—	(b) 27.5 oz.
		Knocktopher,	,,	129	4	9	5	12	11	14	17	16	18	19	16	12	11	10	6	—	150	118	31	1	2	41	123	351	2	5	—	(c) 2,320 Points
		Co. Kilkenny.	,,	130	5	8	7	8	18	17	22	20	21	21	16	5	5	7	7	—	159	148	11	—	1	57	171	386	2	6	—	
			,,	131	5	0	4	0	20	20	19	7	14	17	18	15	16	11	4	—	161	144	17	—	—	59	177	396	2	6	1	
			,,	132	5	4	D		14	8	—	9	19	13	14	11	16	12	D2	—	118	93	23	2	1	20	60	264	2	5	—	

D = Dead

SECTION II.—WHITE WYANDOTTE (STATION HOLDERS)—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1946	No. of Bird	Weight: On Arrival (lb. oz.)	Weight: At Close of Test (lb. oz.)	Production per Period: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs (oz. dr.)	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
11	21	Mrs. W. Coleman,	Feb. 1	85	5 10	6 7	23	24	17	22	21	20	20	22	22	18	21	9	239	136	88	15	—	51	153	546	2 3	—	(a) 941 Eggs
		Banada,	" 19	86	5 10	6 10	19	15	12	19	17	18	20	20	21	20	22	8	211	211	—	—	7	46	138	501	2 8	—	
		Ballaghaderreen,	" 1	87	5 14	D	6	4	—	—	—	—	D	—	—	—	—	—	10	9	1	—	1	10	27	27	2 4	—	(b) 27.9 oz.
		Co. Roscommon.	" "	88	5 6	6 10	18	22	21	22	21	24	26	22	16	24	19	11	246	235	9	2	2	61	183	599	2 5	—	
			" "	89	5 0	5 8	22	16	16	16	14	16	19	18	20	19	19	10	205	180	23	2	3	52	153	499	2 5	—	(c) 2,259 Points
			" "	90	5 8	D	17	d13	—	—	—	—	—	—	—	—	—	—	30	25	4	1	—	29	87	87	2 2	—	
12	20	Mrs. V. A. Archibald,	Jan. 25	79	5 4	5 5	21	18	18	16	13	19	16	15	11	5	10	1	163	103	57	3	1	57	171	388	2 3	—	(a) 764 Eggs
		Edenvale,	"	80	5 5	D	22	22	21	19	20	18	22	12	D	—	—	—	156	152	4	—	—	65	195	377	2 6	—	
		Rathcoole,	Feb. 5	81	5 6	D	24	11	23	9	16	4	—	D	—	—	—	—	87	6	29	52	—	29	87	99	1 15	—	(b) 27.1 oz.
		Co. Dublin.	Jan. 25	82	5 8	6 7	23	14	18	19	17	17	20	14	21	11	11	14	199	186	13	—	—	55	165	489	2 6	3	
			Feb. 14	83	5 3	5 0	22	21	19	16	11	2	11	6	12	13	12	1	146	116	27	3	1	62	186	369	2 4	—	(c) 1,755 Points
			"	84	5 14	D	7	6	D	—	—	—	—	—	—	—	—	—	13	8	3	2	—	11	33	33	2 1	—	

D = Dead.

SECTION III.—RHODE ISLAND RED—22 Pens.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1946	No. of Bird	Weight: On Arrival (lb. oz.)	Weight: At Close of Test (lb. oz.)	Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Special Grade	First Grade	Under First Grade	Non-Scoring Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Scoring Points: Full Period	Average Weight of Eggs (oz. dr.)	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
1	34	Mrs. E. O'Donnell,	February	163	6 10	7 15	7	21	25	10	5	24	25	27	25	24	20	11	224	105	103	16	—	50	150	520	2 3	—	(a) 1,402 Eggs
		Kilbreedy West,	,,	164	5 12	7 3	9	22	20	19	22	24	24	24	25	25	23	10	247	138	104	5	4	46	135	578	2 4	—	
		Kilmallock,	March	165	5 4	6 6	26	20	18	19	18	23	23	24	26	25	21	10	253	32	186	35	2	49	147	532	2 1	—	(b) 26.9 oz.
		Co. Limerick.	February	166	5 13	6 4	11	—	—	15	23	26	27	27	28	28	26	11	222	76	138	8	—	9	27	500	2 3	—	
			,,	167	6 0	6 2	22	27	27	23	22	24	25	25	25	15	17	5	257	248	9	—	51	76	219	506	2 7	—	(c) 3,108 Points
			,,	168	5 12	7 11	—	15	27	23	22	24	21	19	10	10	19	9	199	191	8	—	3	42	126	472	2 6	1	
2	37	Mrs. M. J. Doyle,	Feb. 9	175	4 14	6 6	—	15	6	14	22	21	24	22	23	23	23	13	206	203	3	—	—	21	63	492	2 7	—	(a) 1,285 Eggs
		Carrigeen,	,,	176	5 3	6 4	13	8	3	11	19	19	22	23	26	22	20	10	196	196	—	—	—	24	72	468	2 9	—	
		Baltinglass,	Feb. 16	177	5 6	6 6	11	23	22	19	19	22	25	25	24	23	22	13	248	19	194	35	—	46	138	521	2 1	—	(b) 28.1 oz.
		Co. Wicklow.	Jan. 31	178	5 6	6 15	12	22	11	19	19	21	26	25	20	19	15	—	209	204	5	—	—	45	135	497	2 8	—	
			February	179	5 8	7 8	—	20	23	20	13	3	20	23	23	19	20	7	191	164	26	1	1	42	126	465	2 5	—	(c) 3,013 Points
			,,	180	5 14	7 0	7	20	19	18	19	19	25	24	25	24	23	12	235	184	50	1	1	45	135	570	2 5	—	
3	40	Mrs. S. Harris,	Feb. 12	193	5 15	7 4	11	19	—	—	18	18	22	23	24	21	17	11	184	153	30	1	—	29	87	444	2 4	—	(a) 1,292 Eggs
		Athassel,	,,	194	5 5	6 12	16	17	22	18	19	21	25	24	19	27	27	11	246	65	165	16	—	41	123	565	2 2	—	
		Golden,	,,	195	5 8	7 9	1	17	18	10	9	24	25	27	25	21	20	11	208	71	131	6	—	35	105	488	2 3	—	(b) 26.1 oz.
		Cashel,	,,	196	4 13	5 10	7	21	19	21	18	22	22	23	23	23	23	12	234	32	176	26	—	40	120	504	2 1	—	
		Co. Tipperary.	,,	197	5 4	6 12	3	22	25	23	22	25	25	25	5	9	24	1	209	168	40	1	—	49	147	499	2 5	1	(c) 2,989 Points
			,,	198	5 4	6 14	—	13	23	18	20	20	24	25	28	7	23	10	211	73	135	3	—	33	99	489	2 3	1	
4	55	Miss M. Mulcahy,	January	289	4 8	5 3	5	25	21	20	22	21	19	19	18	5	—	—	175	160	14	1	—	50	150	403	2 5	—	(a) 1,178 Eggs
		Abbeyview,	Feb. 2	290	5 8	6 8	25	19	23	20	26	22	17	19	13	16	14	7	221	218	3	—	6	67	201	533	2 7	—	
		Clonmel,	February	291	5 3	6 4	19	21	21	19	20	22	22	27	19	20	22	9	241	126	114	1	1	61	183	590	2 3	—	(b) 28.0 oz.
		Co. Tipperary.	,,	292	4 13	6 4	11	23	20	22	22	22	24	22	20	13	14	8	221	220	1	—	2	54	162	526	2 6	—	
			Feb. 5	293	4 8	6 6	—	20	20	19	20	21	19	18	17	13	9	5	181	163	18	—	2	40	120	425	2 5	1	(c) 2,808 Points
			,,	294	5 1	7 4	8	20	21	19	20	21	16	6	4	4	—	—	139	133	6	—	—	49	147	331	2 6	—	
5	48	Sister-in-Charge,	Jan. 22	241	4 8	5 5	22	19	22	2	17	21	22	13	11	4	5	2	160	119	38	3	10	61	180	363	2 4	—	(a) 1,192 Eggs
		St. Martha's College,	Feb. 4	242	5 4	5 13	—	—	—	6	19	21	24	25	23	23	22	12	175	147	28	—	—	—	—	407	2 5	—	
		An Uaimh,	,,	243	5 5	5 13	—	—	—	6	21	22	24	22	25	20	17	10	167	158	8	1	—	—	—	378	2 6	—	(b) 26.6 oz.
		Co. Meath.	Jan. 22	244	5 7	5 8	26	19	21	20	18	21	22	22	21	15	15	6	226	107	105	14	3	52	156	505	2 3	—	
			,, 10	245	4 10	5 13	23	21	22	22	21	20	25	26	19	25	24	11	259	185	74	—	34	66	198	570	2 4	—	(c) 2,612 Points
			,, 22	246	4 12	6 0	20	21	19	16	15	16	24	24	23	13	14	—	205	29	134	42	4	47	141	389	2 1	—	

SECTION III.—RHODE ISLAND RED—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1946	No. of Bird	Weight: On Arrival (lb. oz.)	Weight: At Close of Test (lb. oz.)	Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Scoring Points: Full Period	Average Weight of Eggs (oz. dr.)	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
6	52	Mr. M. Fitzgibbon,	March 26	265	6 0	7 4	21	7	20	22	22	20	23	26	24	14	13	2	214	24	179	11	4	43	129	468	2 2	—	(a) 1,104 Eggs
		Gurrane,	,,	266	6 4	7 11	13	17	17	17	21	20	16	14	2	11	11	1	160	149	11	—	1	47	141	388	2 6	—	
		Kilmeedy,	,,	267	6 7	6 12	15	9	14	21	20	19	26	21	27	13	16	7	208	192	13	3	7	35	105	463	2 7	—	(b) 27.3 oz.
		Co. Limerick.	,,	268	6 4	D	22	15	—	D	—	—	—	—	—	—	—	—	37	5	30	2	—	35	105	105	2 0	—	
			,,	269	6 4	6 12	19	20	22	18	18	19	22	23	21	22	18	10	232	228	3	1	—	60	180	572	2 8	—	(c) 2,527 Points
			,,	270	6 6	7 3	20	22	26	25	23	24	24	17	23	20	18	11	253	24	200	29	3	51	150	531	2 1	—	
7	45	Miss M. O'Donovan,	February	217	5 14	6 11	—	—	—	4	21	20	24	24	24	9	23	3	152	150	2	—	—	—	—	339	2 7	1	(a) 1,032 Eggs
		Dromore,	,,	218	5 8	6 13	10	13	17	9	—	16	20	25	24	23	23	12	192	187	4	1	—	39	117	479	2 9	—	
		Villierstown,	,,	219	5 0	6 13	—	—	16	21	22	20	22	24	23	21	20	10	199	185	14	—	—	16	48	465	2 5	—	(b) 28.7 oz.
		Cappoquin,	,,	220	5 2	6 12	—	11	25	21	22	19	22	21	23	20	18	8	210	140	70	—	—	36	108	502	2 4	—	
		Co. Waterford.	,,	221	6 0	7 3	—	20	18	7	—	8	23	23	24	22	22	10	177	176	1	—	—	38	114	446	2 7	—	(c) 2,449 Points
			,,	222	6 0	D	13	16	—	—	15	10	10	14	13	d11	—	—	102	61	33	8	1	22	66	218	2 3	—	
8	54	Sister-in-Charge,	February	283	5 5	7 9	—	1	20	18	20	22	22	22	21	21	19	4	190	70	110	10	—	20	60	420	2 3	—	(a) 1,133 Eggs
		School of Domestic	,,	284	5 5	6 0	22	25	23	18	23	26	21	20	17	17	17	6	235	87	134	14	10	59	177	514	2 2	—	
		Science,	,,	285	5 2	6 14	—	—	20	4	1	19	20	25	18	27	26	11	171	7	99	65	1	12	36	258	2 0	—	(b) 25.9 oz.
		Dunmanway,	,,	286	5 0	6 10	—	6	18	13	—	7	15	9	10	13	7	5	103	51	47	5	2	21	63	237	2 4	—	
		Co. Cork.	,,	287	6 9	7 9	20	22	19	17	20	19	20	23	21	19	20	7	227	171	51	5	—	60	180	549	2 4	—	(c) 2,417 Points
			,,	288	4 8	6 0	—	—	18	19	24	24	22	26	24	18	22	10	207	43	149	15	1	11	33	439	2 2	—	
9	38	Mrs. B. McAuliffe,	March 1	181	5 4	7 8	22	17	15	11	10	13	10	1	3	5	—	—	107	62	42	3	2	51	153	259	2 3	—	(a) 1,054 Eggs
		Farrihy,	,,	182	5 0	7 3	—	21	7	8	20	24	24	25	18	25	19	5	196	172	23	1	—	28	84	466	2 6	—	
		Broadford,	,,	183	4 12	6 6	—	20	17	17	19	23	23	24	22	18	22	11	216	212	4	—	—	37	111	520	2 6	—	(b) 28.2 oz.
		via Charleville,	,,	184	4 12	7 5	—	12	17	1	11	18	26	24	25	18	19	10	181	114	67	—	55	29	87	304	2 4	—	
		Co. Limerick.	,,	185	6 0	7 4	13	19	16	14	10	12	11	9	3	8	7	6	128	128	—	—	20	48	144	279	2 9	—	(c) 2,375 Points
			,,	186	5 8	7 8	11	18	16	14	21	19	22	24	23	23	24	11	226	202	22	2	1	44	132	547	2 5	—	
10	39	Capt. H. M. S. Redmond,	Feb. 25	187	6 6	7 3	—	—	5	19	19	21	22	25	25	23	23	10	192	27	163	2	—	3	9	439	2 2	—	(a) 1,021 Eggs
		Popefield,	,,	188	5 9	D	20	23	7	—	18	D6	—	—	—	—	—	—	74	—	41	33	1	22	66	102	1 15	—	
		Athy,	,,	189	5 4	6 5	—	25	20	21	15	5	27	25	27	26	21	10	222	128	91	3	—	43	129	538	2 3	—	(b) 25.7 oz.
		Co. Kildare.	,,	190	6 2	6 8	21	18	—	—	15	22	23	23	20	18	19	8	187	66	116	5	19	36	108	394	2 2	—	
			,,	191	5 12	8 3	10	19	20	4	—	—	13	23	23	26	21	10	169	92	62	15	2	36	105	396	2 3	—	(c) 2,245 Points
			,,	192	5 4	6 14	22	8	—	—	5	25	28	25	10	22	22	10	177	26	128	23	—	19	57	376	2 1	—	

D = Dead.

SECTION III —RHODE ISLAND RED—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1946	No. of Bird	Weight: On Arrival lb. oz.	Weight: At Close of Test lb. oz.	Production per Period: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs oz. dr.	Number of times Broody	(a) Total Eggs from Pen (b) Average Wt. per dozen. (c) Scoring Points per Pen.
11	49	Mrs. K. Earl,	Feb. 14	247	5 7	7 3	—	11	21	15	6	10	23	22	23	19	21	9	180	140	39	1	—	31	93	438	2 4	—	(a) 960 Eggs
		Granstown House,	„ 11	248	5 3	5 8	—	4	17	8	11	26	25	13	13	9	19	—	145	93	50	2	—	21	63	335	2 4	1	
		Waterford.	„ 14	249	5 2	7 7	4	24	24	21	22	22	25	21	21	23	18	12	237	45	181	11	1	50	150	550	2 2	—	(b) 27.3 oz.
			Jan. 17	250	5 12	D	2	4	17	20	17	18	23	21	23	11	D	—	156	150	4	2	—	21	63	340	2 6	—	
			Feb. 11	251	5 6	6 4	4	17	19	—	16	20	22	25	24	19	20	8	194	193	1	—	—	40	120	475	2 7	—	(c) 2,234 Points
			„ 20	252	4 10	7 14	—	—	—	6	17	20	5	—	—	—	—	—	48	35	13	—	—	—	—	96	2 4	—	
12	36	Mr. D. H. Edwards,	Jan. 25	169	6 3	6 12	16	21	22	17	18	18	19	19	15	9	18	5	197	196	1	—	—	59	177	485	2 6	1	(a) 928 Eggs
		Drumgowan,	Feb. 16	170	6 2	9 0	27	24	22	19	19	15	7	6	—	—	—	—	139	91	38	10	6	63	186	308	2 3	—	
		Burt,	„ 7	171	6 2	7 13	21	26	24	21	21	24	25	24	19	9	22	12	248	162	75	11	2	61	183	573	2 4	1	(b) 27.9 oz.
		Speenogue,	Jan. 25	172	5 10	D	2	—	—	—	—	—	D	—	—	—	—	—	2	1	1	—	—	2	6	6	2 1	—	
		Co. Donegal	Feb. 16	173	5 8	7 8	5	25	24	12	—	21	17	20	18	10	12	12	176	129	42	5	2	49	147	421	2 5	—	(c) 2,164 Points
			March 30	174	4 13	7 2	—	—	13	19	21	22	24	16	16	16	19	—	166	161	4	1	3	12	36	371	2 8	3	
13	50	Miss J. Weston,	March 14	253	5 8	6 15	25	10	—	14	25	24	24	24	20	16	21	12	215	25	160	30	—	23	69	439	2 1	—	(a) 946 Eggs
		Ballymadrough,	„ 24	254	5 4	6 11	2	18	17	18	21	24	23	28	27	26	26	12	242	197	38	7	—	30	90	564	2 5	—	
		Donabate	„ „	255	5 9	6 7	9	23	13	11	19	19	17	24	17	4	12	3	171	153	17	1	3	44	126	394	2 5	2	(b) 27.0 oz.
		Co. Dublin.	„ „	256	5 0	D	—	19	5	21	23	25	25	3	16	—	D	—	137	25	102	10	—	20	60	274	2 2	2	
			„ „	257	5 6	D	—	10	D	—	—	—	—	—	—	—	—	—	10	10	—	—	—	10	30	30	2 4	—	(c) 2,084 Points
			„ „	258	5 11	6 9	—	—	20	20	21	22	23	23	21	6	14	1	171	166	5	—	—	20	60	383	2 7	1	
14	44	Mrs. D. Philpott,	February	211	6 0	6 10	—	13	21	20	—	17	23	18	21	17	15	6	171	115	54	2	3	33	99	400	2 4	—	(a) 905 Eggs
		Charlesfield,	March	212	5 14	6 8	18	19	14	16	13	19	20	22	19	19	18	8	205	62	118	25	1	34	102	434	2 2	—	
		Banteer,	„	213	6 14	7 7	—	8	18	—	—	—	2	13	12	—	—	—	53	8	41	4	—	24	72	122	2 2	—	(b) 26.7 oz.
		Co. Cork.	„	214	5 5	6 4	2	19	14	8	—	6	23	26	24	25	22	11	180	170	9	1	—	34	102	450	2 5	—	
			„	215	6 0	6 5	10	19	10	—	16	5	26	26	18	26	10	4	180	145	34	1	—	38	114	436	2 4	—	(c) 2,072 Points
			„	216	5 7	5 12	—	—	—	4	22	23	26	10	17	—	1	13	116	39	70	7	—	—	—	230	2 3	2	
15	33	Mrs. O. Hodgins,	February	157	5 8	6 10	19	2	4	19	23	21	24	24	12	17	18	—	183	132	43	8	—	22	66	405	2 4	2	(a) 821 Eggs
		Roselawn,	„	158	5 10	D	D	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
		Cloughjordan,	„	159	5 0	D	21	22	D7	—	—	—	—	—	—	—	—	—	50	40	9	1	—	49	147	147	2 3	—	(b) 27.9 oz.
		Co. Tipperary.	„	160	5 8	7 0	12	18	20	4	—	6	27	28	26	24	24	6	195	177	16	2	—	49	147	488	2 5	—	
			„	161	6 0	8 2	—	—	11	21	22	22	24	21	17	18	16	9	181	149	32	—	8	11	33	396	2 5	1	(c) 1,953 Points
			„	162	6 0	7 9	16	21	21	16	19	18	21	24	18	18	14	6	212	211	1	—	1	58	174	517	2 8	—	

D = Dead.

SECTION III.—RHODE ISLAND RED—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1946	No. of Bird	Weight: On Arrival (lb. oz.)	Weight: At Close of Test (lb. oz.)	Production per Period: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs (oz. dr.)	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
16	51	Mr. M. Fitzgibbon,	March 30	259	5 12	6 3	24	26	25	24	24	24	23	11	3	—	—	—	184	19	116	49	—	33	99	303	2 1	—	(a) 787 Eggs
		Gurrane,	,,	260	5 3	5 9	19	4	23	24	23	22	23	7	14	12	13	6	190	163	25	2	—	44	132	451	2 5	5	
		Kilmeedy,	,,	261	6 2	6 6	5	24	21	19	20	23	21	22	24	23	25	8	235	218	15	2	—	48	144	570	2 6	—	(b) 27.9 oz.
		Co. Limerick.	,,	262	5 10	D	19	D	—	—	—	—	—	—	—	—	—	—	19	19	—	—	1	19	54	54	2 6	—	
			,,	263	6 3	7 1	17	19	23	8	—	3	25	19	13	12	10	10	159	159	—	—	3	59	177	403	2 10	3	(c) 1,781 Points
			,,	264	5 12	D	D	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
17	43	Mrs. P. B. Roche,	March	205	5 14	6 12	14	—	13	20	15	16	22	23	23	9	21	2	178	129	46	3	—	24	72	406	2 4	—	(a) 914 Eggs
		Rockview,	,,	206	5 10	6 0	18	3	—	—	19	17	14	11	15	15	13	—	125	27	77	21	—	14	42	246	2 2	5	
		Tullow,	,,	207	6 0	6 11	20	1	—	11	18	25	26	23	15	12	10	9	170	115	42	13	—	8	24	353	2 4	—	(b) 25.6 oz.
		Co. Carlow.	,,	208	6 2	6 9	18	19	21	16	3	—	12	21	21	15	3	9	158	61	84	13	—	46	138	362	2 3	1	
			,,	209	5 14	D	17	—	—	—	D	—	—	—	—	—	—	—	17	2	4	11	—	6	18	18	1 13	—	(c) 1,762 Points
			,,	210	5 14	7 3	27	24	26	25	23	25	23	26	24	20	12	11	266	25	141	100	1	6	18	377	2 0	1	
18	46	Sister-in-Charge,	—	223	6 8	8 0	6	—	8	23	20	21	23	25	21	9	—	—	156	156	—	—	—	14	42	335	2 8	—	(a) 790 Eggs
		Drishane Convent,	—	224	4 14	5 12	15	16	2	2	7	9	22	12	7	5	8	1	106	34	61	11	1	28	84	226	2 2	—	
		Millstreet,	—	225	5 11	D	—	—	—	D	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	(b) 28.5 oz.
		Co. Cork.	—	226	6 10	7 6	2	—	9	19	—	14	23	24	20	19	20	10	160	26	128	6	—	8	24	363	2 2	—	
			—	227	5 5	6 10	25	24	24	25	10	20	24	26	17	20	12	3	230	195	30	5	10	68	204	523	2 5	—	(c) 1,758 Points
			—	228	5 2	7 6	—	—	—	—	13	23	24	20	21	13	16	8	138	138	—	—	1	—	—	311	2 13	1	
19	47	Mrs. L. Hayes,	Feb. 6	229	5 11	5 8	3	—	—	3	22	24	24	18	—	—	—	—	94	24	70	—	2	3	9	187	2 3	—	(a) 864 Eggs
		Walshestown,	,,	230	6 0	D	15	23	19	16	18	20	22	22	22	9	D	—	186	106	74	6	—	53	159	422	2 3	—	
		Castlemahon,	,,	231	6 10	D	15	13	—	—	D	—	—	—	—	—	—	—	28	27	1	—	1	28	81	81	2 6	—	(b) 25.6 oz.
		Newcastle West,	,,	232	6 13	6 12	—	—	8	17	23	20	23	23	22	13	—	—	149	121	26	2	—	8	24	313	2 4	1	
		Co. Limerick.	,,	233	5 12	6 4	—	19	24	27	26	26	21	18	8	—	—	—	169	37	121	11	—	43	129	359	2 2	—	(c) 1,671 Points
			,,	234	5 0	5 10	25	25	26	27	21	22	23	25	14	21	9	—	238	5	131	102	1	11	33	309	1 15	—	
20	32	Mrs. M. K. Murphy,	Feb. 2	151	5 10	7 14	1	16	21	17	17	13	15	17	11	10	4	—	142	132	10	—	—	38	114	336	2 5	—	(a) 773 Eggs
		Rockgrove,	,,	152	5 4	5 14	—	—	—	8	20	20	21	17	19	15	14	2	136	84	51	1	—	—	—	301	2 4	—	
		Belmont Park,	,,	153	5 2	6 6	16	20	20	18	20	18	22	20	7	—	—	—	161	75	77	9	—	47	141	351	2 3	—	(b) 26.2 oz.
		Cork.	,,	154	6 8	D	17	7	10	15	23	23	22	3	3	—	D	—	123	14	61	48	—	21	63	171	2 0	—	
			,,	155	5 0	4 10	—	—	3	16	18	11	12	16	1	—	5	4	86	53	32	1	—	3	9	182	2 4	—	(c) 1,601 Points
			,,	156	6 3	6 0	—	—	—	10	20	22	25	25	6	—	10	7	125	26	96	3	—	—	—	260	2 2	—	

D = Dead.

SECTION III.—RHODE ISLAND RED—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1946	No. of Bird	Weight: On Arrival (lb. oz.)	Weight: At Close of Test (lb. oz.)	Production per Period: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs (oz. dr.)	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
21	53	Rev. Bro. Dominick,	March 12	277	4 8	D	—	—	—	—	—	D	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	(a) 636 Eggs
		Agricultural College,	,,	278	4 8	D	—	—	D	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
		Mount Bellew,	,,	279	4 8	5 0	—	—	2	18	21	8	5	2	—	4	4	*3	67	47	15	5	—	2	6	133	2 5	—	(b) 26.9 oz.
		Co. Galway.	,,	280	4 10	6 4	5	22	24	22	20	21	17	26	20	25	21	9	232	47	178	7	1	49	144	549	2 2	—	
			,,	281	4 8	7 8	—	—	—	13	22	19	19	25	26	18	21	11	174	165	9	—	—	—	—	398	2 5	—	(c) 1,452 Points
			,,	282	4 12	7 2	—	—	—	9	23	20	21	21	23	21	16	9	163	139	24	—	—	—	—	372	2 5	—	
22	41	Mrs. S. Harris,	March 9	199	5 3	D	9	10	8	11	13	14	23	16	24	D9	—	—	137	9	106	22	3	14	33	244	2 1	—	(a) 739 Eggs
		Athassel,	,,	200	5 4	7 6	19	9	8	12	6	13	16	11	6	6	10	—	116	101	13	2	8	34	96	256	2 5	—	
		Golden,	,,	201	4 14	6 8	2	24	21	21	11	16	25	26	26	27	25	13	237	6	97	134	—	3	9	252	1 15	—	(b) 26.4 oz.
		Cashel,	,,	202	5 4	9 0	3	13	12	4	9	11	14	14	12	9	10	2	113	107	6	—	2	28	84	269	2 8	—	
		Co. Tipperary.	,,	203	5 4	D	8	19	15	19	12	17	20	12	D5	—	—	—	127	123	3	1	—	41	123	293	2 7	—	(c) 1,341 Points
			,,	204	5 4	D	9	—	D	—	—	—	—	—	—	—	—	—	9	5	4	—	—	9	27	27	2 2	—	

D = Dead.

SECTION IV.—RHODE ISLAND RED (STATION HOLDERS)—28 Pens.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1946	No. of Bird	Weight: On Arrival (lb. oz.)	Weight: At Close of Test (lb. oz.)	Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	Grading: First Grade	Grading: Under First Grade	Grading: Non-Scoring, Special and First Grade	Grading: Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Scoring Points: Full Period	Average Weight of Eggs (oz. dr.)	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
1	72	Mrs. M. F. Smith,	February	385	5 13	6 3	9	18	20	19	19	20	23	25	21	18	17	10	219	219	—	—	—	47	141	530	2 8	—	(a) 1,282 Eggs
		Bridge House,	,,	386	6 4	7 10	6	21	16	17	15	19	21	21	18	20	21	8	203	202	1	—	6	43	129	484	2 9	—	
		Bettystown,	,,	387	5 7	7 8	8	23	2	15	23	21	26	28	28	26	26	8	234	225	9	—	9	33	96	534	2 5	—	(b) 29.5 oz.
		Co. Meath.	,,	388	6 1	7 8	17	21	18	19	—	8	24	26	24	25	23	9	214	193	20	1	—	56	168	539	2 5	—	
			,,	389	5 8	7 0	13	21	21	18	18	18	22	24	24	23	21	10	233	232	1	—	—	55	165	575	2 8	—	(c) 3,074 Points
			,,	390	5 14	6 8	—	—	6	21	15	20	22	21	21	22	22	9	179	179	—	—	2	6	18	412	2 9	—	
2	60	Mrs. M. A. Kelly,	Feb. 8	313	5 7	5 12	18	20	20	20	21	20	27	24	20	3	9	12	214	90	121	3	7	55	165	487	2 3	1	(a) 1,272 Eggs
		Carronstown,	,,	314	4 14	5 12	16	4	21	23	24	24	23	22	18	25	20	12	232	72	147	13	3	30	87	517	2 2	—	
		Ballivor,	,,	315	4 11	5 11	27	23	22	20	21	21	23	23	22	11	20	10	243	45	186	12	—	65	195	567	2 2	1	(b) 26.3 oz.
		Co. Meath.	,,	316	5 5	8 0	7	19	20	20	17	21	23	24	24	25	25	9	234	194	38	2	—	44	132	567	2 5	—	
			,,	317	4 8	7 7	12	21	20	19	19	21	22	21	12	12	2	1	182	100	80	2	6	53	159	412	2 3	—	(c) 2,959 Points
			,,	318	5 2	7 0	22	20	26	24	19	16	14	12	4	4	5	1	167	90	76	1	—	67	201	409	2 3	—	
3	57	Mrs. O. Hodgins,	February	295	5 10	6 12	5	3	19	20	23	17	24	15	15	11	13	—	165	76	82	7	—	23	69	362	2 3	3	(a) 1,236 Eggs
		Roselawn,	,,	296	5 5	6 13	12	23	22	16	19	19	20	15	16	18	18	8	206	193	13	—	—	57	171	513	2 7	—	
		Cloughjordan,	,,	297	5 0	6 8	—	8	26	23	26	26	21	25	25	21	22	11	234	180	54	—	1	34	102	553	2 5	—	(b) 28.0 oz.
		Co. Tipperary.	,,	298	5 6	6 13	9	23	23	18	17	18	22	26	22	19	21	10	228	158	69	1	2	55	165	555	2 4	—	
			,,	299	5 0	7 9	—	—	11	21	21	26	25	27	23	24	14	12	204	102	97	5	2	8	24	449	2 3	—	(c) 2,909 Points
			,,	300	6 6	8 0	3	9	21	7	10	23	23	24	25	25	20	9	199	197	2	—	3	33	99	477	2 10	—	
4	76	Miss C. Mealiff,	Feb. 7	409	5 8	6 6	7	—	16	18	21	21	23	24	22	18	22	9	201	190	11	—	3	23	69	465	2 6	—	(a) 1,193 Eggs
		Ballinamona House,	,,	410	5 10	6 15	—	—	16	19	20	21	25	24	25	26	24	11	211	111	98	2	—	15	45	494	2 3	—	
		Tullamore,	,,	411	5 0	6 4	—	14	23	19	23	21	24	25	24	22	24	11	230	45	179	6	—	37	111	541	2 2	—	(b) 27.6 oz.
		Offaly.	,,	412	5 12	7 4	—	13	19	11	9	18	24	26	22	22	22	10	196	193	2	1	—	31	93	475	2 6	—	
			,,	413	5 4	6 4	1	13	17	7	—	16	21	22	20	18	20	6	161	157	4	—	—	31	93	397	2 8	—	(c) 2,847 Points
			,,	414	4 14	6 6	—	19	25	14	—	22	26	23	22	17	19	7	194	114	80	—	—	44	132	475	2 4	—	
5	58	Mrs. E. O'Donnell,	March	301	5 12	7 0	—	18	22	22	20	25	25	25	23	23	22	12	237	136	100	1	5	39	114	557	2 3	—	(a) 1,421 Eggs
		Kilbreedy West,	February	302	5 4	6 6	—	—	25	23	19	23	26	26	23	26	22	10	223	204	18	1	—	24	72	526	2 5	—	
		Kilmallock,	,,	303	5 9	7 4	—	19	24	21	17	16	24	28	28	25	27	12	241	30	178	33	—	39	117	503	2 1	—	(b) 25.9 oz.
		Co. Limerick.	,,	304	5 4	7 8	16	25	24	23	23	23	24	25	20	20	19	9	251	6	114	131	—	14	42	299	1 15	—	
			,,	305	6 4	7 12	27	26	20	20	22	20	26	23	25	26	25	11	271	6	176	89	—	7	21	426	2 0	—	(c) 2,801 Points
	—		,,	306	5 6	6 14	21	15	16	16	13	18	20	20	15	19	18	7	198	195	3	—	1	52	156	490	2 8	—	

D = Dead.

SECTION IV.—RHODE ISLAND RED (STATION HOLDERS)—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1946	No. of Bird	Weight: On Arrival lb. oz.	Weight: At Close of Test lb. oz.	Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs oz. dr.	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
6	73	Mrs. S. Collier,	February	391	6 0	7 4	19	18	20	18	4	—	13	25	24	21	22	11	195	121	70	4	2	53	159	484	2 3	—	(a) 1,177 Eggs
		Boggan,	,,	392	5 8	5 8	10	14	17	16	14	10	19	20	21	8	—	6	155	49	90	16	—	28	84	319	2 2	1	
		Kilbride,	,,	393	5 10	7 8	21	19	19	19	14	21	22	27	21	20	21	7	231	216	15	—	2	59	177	564	2 5	—	(b) 27.0 oz.
		Tullow,	,,	394	6 0	6 8	16	16	19	18	13	7	19	17	23	20	—	—	168	162	6	—	—	51	153	407	2 8	—	
		Co. Carlow.	,,	395	4 14	5 10	23	22	17	20	20	17	21	23	23	22	22	10	240	71	150	19	—	44	132	539	2 2	—	(c) 2,760 Points
			,,	396	5 10	6 10	21	22	20	8	2	21	26	23	19	—	23	3	188	109	74	5	1	59	177	447	2 3	1	
7	80	Miss M. Mulcahy,	February	433	5 7	6 13	22	20	20	21	24	18	21	22	19	19	16	11	233	181	49	3	—	60	180	566	2 4	—	(a) 1,147 Eggs
		Abbeyview,	Feb. 5	434	4 12	6 12	4	22	20	15	16	21	19	11	8	7	6	2	151	73	75	3	5	46	138	341	2 3	—	
		Clonmel,	,,	435	4 8	6 8	—	—	—	17	18	21	24	26	20	20	20	9	175	174	1	—	—	—	—	399	2 8	—	(b) 27.8 oz.
		Co. Tipperary.	February	436	4 8	7 6	11	24	19	20	15	16	16	14	14	19	12	4	184	146	37	1	2	53	159	450	2 4	—	
			January	437	5 2	5 6	16	19	21	8	4	19	23	24	24	24	22	6	210	153	57	—	—	56	168	528	2 4	—	(c) 2,712 Points
			February	438	4 8	6 4	—	—	—	22	23	25	26	24	25	19	22	8	194	189	5	—	4	—	—	428	2 7	—	
8	74	Mrs. L. Hayes,	Feb. 13	397	6 0	7 7	19	20	22	20	20	17	19	10	7	6	—	1	161	33	123	5	37	56	165	293	2 2	—	(a) 1,208 Eggs
		Walshestown,	,,	398	5 3	6 9	22	24	21	18	19	21	24	21	24	21	22	12	249	197	52	—	3	67	198	612	2 4	—	
		Castlemahon,	,,	399	5 11	6 8	11	8	5	19	25	23	28	22	27	23	8	10	209	63	120	26	21	15	45	364	2 2	—	(b) 26. 2 oz.
		Newcastle West,	,,	400	6 4	8 1	21	22	22	15	20	22	24	25	26	19	26	10	252	123	125	4	2	62	186	607	2 3	—	
		Co. Limerick.	,,	401	6 8	7 8	19	19	16	18	15	13	5	5	—	—	—	—	110	64	46	—	1	54	162	272	2 3	—	(c) 2,655 Points
			,,	402	6 0	7 0	13	18	21	15	22	22	22	22	25	21	19	7	227	124	88	15	1	39	117	507	2 3	—	
9	71	Mrs. M. A. McNeice,	Feb. 8	379	6 0	7 9	17	22	18	20	18	19	22	22	22	20	9	4	213	204	5	4	—	53	159	504	2 6	—	(a) 1,285 Eggs
		Tomacrow,	,,	380	5 0	7 0	22	21	15	21	18	20	19	13	11	13	7	5	185	40	127	18	1	54	162	410	2 2	—	
		Drumacrib,	,,	381	5 10	5 8	26	26	27	20	21	23	24	15	11	13	13	2	221	154	67	—	1	79	234	546	2 4	2	(b) 26.5 oz.
		Castleblayney,	,,	382	4 12	6 12	16	19	24	19	20	22	19	17	18	20	15	7	216	171	41	4	5	58	174	511	2 5	—	
		Co. Monaghan.	,,	383	5 10	7 8	19	21	17	9	22	21	25	23	22	17	19	10	225	167	56	2	2	57	171	542	2 4	—	(c) 2,654 Points
			,,	384	4 14	6 2	23	22	23	23	20	20	23	18	18	21	13	1	225	4	109	112	61	37	111	141	1 15	—	
10	69	Mrs. C. Healy,	Feb. 7	367	5 11	7 1	—	5	20	8	19	17	20	23	24	23	19	6	184	37	144	3	—	24	72	434	2 2	—	(a) 1,145 Eggs
		Clonmeen,	,,	368	6 10	8 2	—	—	16	21	18	18	15	18	11	15	6	7	145	144	1	—	—	16	48	334	2 10	—	
		Banteer,	,,	369	5 10	6 12	23	20	20	21	20	22	22	22	23	19	19	7	238	111	122	5	1	58	174	566	2 3	—	(b) 27.6 oz.
		Co. Cork.	,,	370	6 2	7 8	—	—	7	20	24	25	27	28	26	26	25	12	220	177	42	1	—	6	18	507	2 5	—	
			,,	371	6 1	7 8	—	—	—	17	21	21	23	23	21	8	11	2	147	143	4	—	—	—	—	315	2 6	2	(c) 2,650 Points
			,,	372	6 8	7 12	—	—	16	23	22	19	26	25	24	21	24	11	211	183	28	—	—	16	48	494	2 5	—	

SECTION IV.—RHODE ISLAND RED (STATION HOLDERS)—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1946	No. of Bird	Weight: On Arrival (lb. oz.)	Weight: At Close of Test (lb. oz.)	Production per Period: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs (oz. dr.)	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
11	84	Mrs. J. Plunkett,	March 22	235	4 8	6 8	—	—	3	12	23	24	21	20	17	18	8	5	151	144	7	—	6	3	9	322	2 7	—	(a) 1,109 Eggs
		Killeenmore,	,,	236	4 8	6 12	—	10	16	13	18	14	15	15	22	17	18	8	166	146	18	2	2	25	75	391	2 5	—	
		Killeigh,	,,	237	4 8	6 3	—	5	21	21	23	23	25	27	24	26	21	12	228	227	1	—	1	26	78	539	2 7	—	(b) 28.5 oz.
		Offaly.	,,	238	4 8	6 9	—	13	23	18	18	18	23	26	23	24	19	11	216	196	19	1	—	35	105	519	2 5	—	
			,,	239	4 14	6 0	—	10	20	18	21	23	24	21	22	10	19	—	188	175	12	1	4	30	90	420	2 6	1	(c) 2,545 Points
			,,	240	4 13	7 6	17	21	13	8	2	19	18	16	15	16	12	3	160	143	15	2	16	49	144	354	2 5	—	
12	64	Capt. H. M. S. Redmond,	Feb. 25	337	5 8	6 0	7	1	18	16	21	23	25	25	23	23	20	9	211	209	2	—	6	26	78	484	2 8	—	(a) 1,112 Eggs
		Popefield,	,,	338	6 12	6 12	—	18	13	20	16	19	21	16	7	—	—	—	130	115	15	—	1	31	93	289	2 6	—	
		Athy,	,,	339	5 12	D	—	—	13	16	21	20	24	24	D	—	—	—	118	19	74	25	—	12	36	198	2 1	—	(b) 27.8 oz.
		Co. Kildare.	,,	340	5 12	7 0	11	15	19	23	23	24	26	20	23	14	23	11	232	83	141	8	1	37	111	530	2 3	—	
			March 9	341	6 7	7 8	22	20	20	19	18	18	23	20	21	12	16	6	215	213	2	—	1	62	186	523	2 6	—	(c) 2,528 Points
			,,	342	7 0	7 12	21	18	20	6	16	22	24	23	23	12	17	4	206	184	22	—	—	59	177	504	2 6	—	
13	82	Miss E. A. Bissett,	March 10	445	5 3	6 8	19	21	19	20	20	21	25	24	24	22	25	14	254	66	163	25	—	35	105	554	2 2	—	(a) 1,288 Eggs
		The Matt,	,,	446	5 4	6 2	18	23	25	19	20	19	23	25	23	23	22	9	249	96	118	35	7	32	96	497	2 2	—	
		Delahasey,	,,	447	5 9	7 0	—	3	—	9	24	25	26	23	23	—	17	11	161	156	2	3	6	—	—	326	2 6	1	(b) 25.6 oz.
		Co. Dublin.	,,	448	5 13	7 6	—	21	27	24	13	—	26	26	23	25	25	13	223	5	115	103	—	16	48	291	2 0	—	
			,,	449	5 1	6 11	15	18	21	21	21	20	22	20	19	18	19	9	223	39	157	27	—	36	108	474	2 1	—	(c) 2,492 Points
			,,	450	5 4	6 2	18	19	8	5	23	20	23	23	19	4	16	—	178	45	110	23	1	22	66	350	2 2	1	
14	63	Mrs. B. McAuliffe,	Feb. 1	331	4 8	D	11	7	—	4	9	6	D	—	—	—	—	—	37	35	2	—	3	18	54	86	2 9	—	(a) 1,032 Eggs
		Farriby,	,,	332	5 0	6 0	26	19	21	20	22	23	22	15	27	3	15	8	221	170	50	1	26	66	198	456	2 4	—	
		Broadford,	,,	333	5 8	7 7	18	16	18	2	10	21	19	19	21	21	10	9	184	182	2	—	13	52	153	431	2 8	—	(b) 28.0 oz.
		via Charleville,	,,	334	5 3	6 11	20	16	25	6	—	17	28	24	20	18	6	3	183	137	44	2	17	59	171	407	2 4	—	
		Co. Limerick.	,,	335	4 12	6 8	1	27	27	11	—	21	26	24	15	18	24	9	203	196	7	—	4	55	159	500	2 7	1	(c) 2,365 Points
			,,	336	5 2	7 2	9	23	15	18	22	23	24	8	25	14	20	3	204	95	106	3	—	46	138	485	2 3	1	
15	61	E. Bean Mhic Dhomhnaill,	Jan. 24	319	4 10	6 4	7	18	25	24	25	23	22	9	15	11	1	8	188	126	62	—	1	50	150	443	2 5	2	(a) 1,061 Eggs
		Imeall Átha,	,, ,,	320	4 14	6 7	25	22	28	25	27	26	18	24	17	15	12	4	243	41	180	22	3	56	168	520	2 2	—	
		Baile an Fheirtéirigh,	,, 18	321	5 6	8 6	15	22	21	23	24	25	18	17	10	13	8	3	199	196	2	1	6	57	171	465	2 8	1	(b) 27.5 oz.
		Co. Chiarraidhe.	,, ,,	322	4 12	6 8	7	17	23	18	23	23	25	26	21	10	10	4	207	120	85	2	6	45	135	461	2 3	—	
			,, 20	323	5 6	D	22	13	—	—	D	—	—	—	—	—	—	—	35	35	—	—	1	35	102	102	2 5	—	(c) 2,314 Points
			,, ,,	324	4 9	7 12	5	5	16	13	17	24	27	20	19	16	19	8	189	182	7	—	43	26	78	323	2 7	—	

D = Dead.

SECTION IV.—RHODE ISLAND RED (STATION HOLDERS)—*continued.*

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1946	No. of Bird	Weight: On Arrival lb. oz.	Weight: At Close of Test lb. oz.	Production per Period: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First-Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
16	66	Mrs. M. Kennedy,	Jan. 20	349	6 0	7 0	9	—	6	12	1	15	23	24	21	22	21	9	163	153	8	2	3	13	39	379	2 7	—	(a) 1,102 Eggs
		Kilderry House,	,,	350	5 8	7 0	5	6	—	2	25	24	21	26	25	22	24	9	189	4	109	76	—	9	27	260	2 0	—	
		Fedamore,	,,	351	5 13	7 4	23	24	25	19	18	20	20	19	1	—	—	—	169	130	39	—	—	72	216	410	2 4	—	(b) 26.9 oz.
		Co. Limerick.	,,	352	5 4	6 2	15	21	24	23	22	24	27	25	27	25	20	12	265	62	196	7	2	55	165	624	2 2	—	
			,,	353	5 0	6 0	6	18	19	19	20	20	23	24	21	22	19	4	215	114	101	—	—	43	129	518	2 4	—	(c) 2,298 Points
			,,	354	5 8	8 0	3	16	10	—	—	17	24	15	13	—	—	3	101	99	1	1	61	28	84	107	2 11	—	
17	77	Mrs. M. C. McCormack,	February	415	6 6	8 10	3	—	4	16	13	13	17	18	11	—	—	—	95	40	49	6	2	7	21	181	2 3	—	(a) 1,016 Eggs
		Bawnogues,	,,	416	5 3	7 6	—	—	17	22	21	21	24	25	24	21	19	9	203	177	26	—	—	17	51	472	2 5	—	
		Kilcock,	,,	417	5 12	7 4	7	1	22	18	16	18	22	24	20	24	23	11	206	73	120	13	3	27	81	460	2 3	—	(b) 27.1 oz.
		Co. Kildare.	,,	418	6 7	7 4	19	21	9	20	18	18	20	15	—	—	—	—	140	112	28	—	1	49	144	326	2 4	—	
			,,	419	5 12	8 8	20	21	19	20	16	17	23	21	17	14	10	2	200	138	59	3	27	57	138	404	2 4	—	(c) 2,247 Points
			,,	420	5 12	6 10	—	—	6	17	11	7	24	27	26	24	19	11	172	168	4	—	—	6	18	404	2 7	—	
18	62	Mrs. M. J. Doyle,	January	325	5 11	7 2	—	7	22	19	17	19	24	20	22	20	21	1	192	185	6	1	—	28	84	452	2 5	—	(a) 951 Eggs
		Carrigeen,	Feb. 16	326	5 13	7 8	14	19	18	16	17	18	24	18	12	15	11	4	186	181	4	1	1	50	150	447	2 7	—	
		Baltinglass,	Jan. 25	327	5 10	D	21	15	—	—	—	—	—	—	D	—	—	—	36	36	—	—	—	36	108	108	2 8	1	(b) 28.4 oz.
		Co. Wicklow.	March 12	328	5 10	7 0	18	16	14	8	12	16	20	22	23	18	17	10	194	156	37	1	1	48	141	476	2 4	—	
			Jan. 17	329	6 3	8 0	—	6	17	20	17	7	21	24	22	22	21	9	186	184	2	—	—	23	69	447	2 8	—	(c) 2,299 Points
			Feb. 9	330	5 7	7 0	—	—	6	15	11	19	18	18	21	20	18	11	157	141	16	—	—	6	18	369	2 5	—	
19	67	Mrs. D. Philpott,	February	355	7 5	8 0	—	—	11	19	21	21	22	22	24	5	16	9	170	164	5	1	—	10	30	378	oz. dr. 2 6	—	(a) 956 Eggs
		Charlesfield,	March	356	7 1	7 14	—	2	19	15	—	—	17	27	25	21	22	11	159	142	17	—	—	21	63	393	2 5	—	
		Banteer,	,,	357	6 8	8 2	22	23	21	1	—	8	26	26	23	17	19	13	199	77	109	13	3	55	165	467	2 3	—	(b) 28.1 oz.
		Co. Cork.	,,	358	6 8	7 13	—	—	7	17	15	17	15	21	21	23	20	10	166	166	—	—	1	7	21	390	2 8	—	
			,,	359	6 9	7 4	—	—	—	3	19	20	24	25	25	24	16	9	165	158	7	—	3	—	—	371	2 6	—	(c) 2,231 Points
			,,	360	6 14	7 4	—	—	—	8	2	—	7	19	21	16	17	7	97	85	12	—	1	—	—	232	2 6	—	
20	68	Miss M. O'Donovan,	February	361	5 10	7 7	—	13	5	22	23	21	20	25	12	16	24	4	185	183	2	—	1	18	51	429	2 7	—	(a) 942 Eggs
		Dromore,	,,	362	5 9	6 8	—	—	—	—	15	25	25	26	21	26	22	14	174	150	23	1	2	—	—	402	2 5	—	
		Villierstown,	,,	363	5 3	6 4	—	16	16	9	9	21	23	22	24	21	17	—	178	155	23	—	—	32	96	426	2 5	—	(b) 27.3 oz.
		Cappoquin,	,,	364	4 13	6 4	19	18	26	23	22	23	24	23	24	25	23	13	263	121	137	5	7	60	180	617	2 3	—	
		Co. Waterford.	,,	365	5 4	7 3	2	11	12	16	12	—	15	17	18	16	18	5	142	54	78	10	1	17	51	318	2 3	—	(c) 2,192 Points
			,,	366	6 3	D	—	—	—	D	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	

D = Dead.

SECTION IV —RHODE ISLAND RED—(STATION HOLDERS)—continued

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1946	No. of Bird	Weight On Arrival lb. oz.	Weight At Close of Test lb. oz.	Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	Grading: First Grade	Grading: Under First Grade	Grading: Non-Scoring, Special and First Grade	Grading: Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Scoring Points: Full Period	Average Weight of Eggs oz. dr.	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
21	78	Miss J. Weston	March 3	421	5 11	6 8	25	18	3	22	19	21	22	10	14	8	18	—	180	140	39	1	1	45	135	426	2 5	1	(a) 822 Eggs
		Ballymadrough,	,,	422	6 2	6 8	13	—	15	12	15	2	—	—	—	—	—	—	57	47	7	3	2	25	69	127	2 6	—	
		Donabate,	,,	423	6 11	8 1	14	21	18	20	17	—	15	21	20	15	13	10	184	180	4	—	10	53	159	436	2 7	—	(b) 28.3 oz.
		Co. Dublin.	March 14	424	5 7	6 1	8	17	20	19	16	16	19	19	20	20	10	—	184	175	9	—	—	45	135	443	2 6	—	
			,, 3	425	6 2	D	12	11	D	—	—	—	—	—	—	—	—	—	23	23	—	—	1	23	66	66	2 10	—	(c) 1.965 Points
			,, 14	426	6 3	7 7	6	19	22	20	14	15	17	18	17	15	21	10	194	170	23	1	4	46	135	467	2 5	—	
22	79	Mr. W. Murphy,	Feb. 10	427	5 8	8 0	16	11	14	21	20	18	26	23	20	21	24	9	223	102	108	13	6	28	81	485	2 3	—	(a) 932 Eggs
		Skeeter Park,	,,	428	5 6	8 4	8	9	17	18	20	21	24	25	20	9	7	—	178	30	138	10	3	31	93	376	2 2	—	
		Cleariestown,	,,	429	5 12	D	9	—	13	5	21	24	26	10	—	—	D	—	108	67	41	—	1	22	63	235	2 4	—	(b) 25.6 oz.
		Co. Wexford.	,,	430	6 2	D	11	16	—	—	—	1	5	D	—	—	—	—	33	2	13	18	1	15	42	42	1 15	—	
			,,	431	6 6	7 12	6	10	24	19	17	20	22	15	22	22	19	7	203	94	102	7	3	35	105	465	2 3	—	(c) 1,907 Points
			,,	432	5 9	6 14	25	24	21	20	22	22	21	20	7	5	—	—	187	8	119	60	—	48	144	304	2 0	—	
23	75	Mrs. K. Sammon,	Feb. 24	403	4 8	D	11	21	20	16	15	—	16	5	6	D	—	—	110	47	62	1	1	52	153	267	2 3	—	(a) 828 Eggs
		Carrigahorig,	,,	404	5 13	4 8	20	22	19	22	18	12	15	19	15	10	—	—	172	66	98	8	3	56	168	387	2 8	—	
		Birr,	,,	405	5 10	8 0	19	20	19	17	16	20	20	21	17	18	19	7	213	212	1	—	3	58	171	519	2 10	—	(b) 27.4 oz.
		Offaly.	,,	406	4 12	D	17	21	23	20	20	19	4	—	D	—	—	—	124	12	83	29	1	47	141	235	2 0	—	
			,,	407	4 8	D	15	16	3	—	D	—	—	—	—	—	—	—	34	3	15	16	—	18	54	54	1 15	—	(c) 1,880 Points
			,,	408	4 14	7 0	14	26	22	22	22	19	13	16	11	7	3	—	175	158	17	—	2	62	186	418	2 5	—	
24	70	Mrs. M. Reynolds,	Feb. 14	373	5 4	6 10	7	24	20	5	16	13	21	13	18	8	13	8	166	140	25	1	1	50	150	406	2 5	—	(a) 1,145 Eggs
		Racefield,	,,	374	5 6	7 0	24	24	24	21	21	20	24	27	27	26	27	13	278	—	53	225	—	4	12	124	1 14	—	
		Mungret,	,,	375	5 4	6 12	23	23	22	18	19	20	21	15	13	14	15	4	207	91	108	8	67	61	183	325	2 3	—	(b) 25.3 oz.
		Limerick.	,,	376	5 10	D	22	23	23	23	20	24	25	25	d24	—	—	—	209	69	108	32	—	39	117	393	2 2	—	
			,,	377	5 3	6 6	—	—	8	17	3	25	19	23	17	13	11	9	145	98	45	2	—	8	24	327	2 4	2	(c) 1,854 Points
			,,	378	5 4	6 0	19	4	—	—	21	23	21	14	18	9	—	11	140	33	92	15	—	9	27	279	2 2	2	
25	83	Mrs. M. K. Murphy,	Feb. 28	451	5 1	6 8	—	4	22	25	22	26	26	27	24	20	19	9	224	28	185	11	—	24	72	498	2 2	—	(a) 997 Eggs
		Rockgrove,	,,	452	5 6	6 15	—	23	21	25	25	24	22	26	24	27	24	11	252	9	130	113	—	9	27	347	2 0	—	
		Belmont Park,	,,	453	4 8	5 0	—	—	13	22	20	22	21	20	19	18	16	4	175	3	93	79	—	9	27	224	2 0	—	(b) 25.0 oz.
		Cork.	,,	454	4 11	D	11	D	—	—	—	—	—	—	—	—	—	—	11	—	3	8	—	3	9	9	1 14	—	
			,,	455	5 8	6 14	6	26	23	24	22	25	25	21	20	17	18	9	236	87	147	2	2	54	162	560	2 3	—	(c) 1,839 Points
			Feb. 24	456	5 11	5 0	—	—	3	7	22	20	20	21	6	—	—	—	99	94	5	—	—	3	9	201	2 5	—	

D = Dead.

SECTION IV.—RHODE ISLAND RED (STATION HOLDERS)—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1946	No. of Bird	Weight: On Arrival (lb. oz.)	Weight: At Close of Test (lb. oz.)	Production per Period: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct 1–Dec. 23	Full Period	Average Weight of Eggs (oz. dr.)	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
26	59	Mr. D. H. Edwards,	Feb. 7	307	6 0	8 0	—	—	15	19	21	16	26	20	18	4	—	2	141	140	1	—	—	15	45	303	2 8	2	(a) 784 Eggs
		Drumgowan,	Jan. 25	308	6 10	7 14	24	22	—	—	23	26	22	25	16	24	—	7	189	114	66	9	1	38	114	427	2 3	2	
		Burt,	Feb. 7	309	5 6	7 12	—	22	—	7	17	14	15	12	5	8	7	8	115	113	2	—	—	22	66	275	2 8	3	(b) 28.7 oz.
		Speenogue P.O.,	,, 24	310	5 4	D	25	6	22	24	22	21	27	25	14	d19	—	—	205	172	28	5	5	48	144	456	2 5	1	
		Co. Donegal.	,, 16	311	5 12	8 12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	(c) 1,773 Points
			Mar. 30	312	5 3	8 0	—	10	16	10	15	12	16	17	10	13	6	9	134	123	11	—	4	26	75	312	2 7	2	
27	81	Mrs. M. O'Reilly,	Feb. 14	439	5 7	6 0	23	21	19	16	18	19	18	19	19	22	15	8	217	11	150	56	7	22	66	364	2 0	—	(a) 906 Eggs
		St. Johnsfort,	,,	440	5 14	6 12	23	22	19	20	19	19	24	20	18	17	19	4	224	20	180	24	—	48	144	487	2 1	1	
		Ardee,	,,	441	5 8	7 6	12	19	2	15	21	20	24	23	11	17	14	6	184	158	25	1	—	32	96	435	2 5	1	(b) 25.5 oz.
		Co. Meath.	,,	442	5 15	7 8	14	4	13	—	14	19	17	20	19	9	17	1	147	123	24	—	—	31	93	352	2 5	—	
			,,	443	6 2	7 8	20	21	13	17	19	16	24	4	—	—	—	—	124	2	37	85	—	7	21	85	1 14	1	(c) 1,741 Points
			,,	444	5 7	D	9	D1	—	—	—	—	—	—	—	—	—	—	10	3	3	4	—	6	18	18	2 0	—	
28	65	Mrs. E. Hammersley,	Jan. 21	343	5 10	D	—	2	10	3	4	—	—	D	—	—	—	—	19	14	2	3	—	11	33	43	2 6	—	(a) 759 Eggs
		Ashvale,	,,	344	5 8	7 0	7	21	18	11	—	6	22	22	23	21	23	10	184	175	9	—	—	46	138	468	2 6	—	
		Lattin,	,,	345	5 8	D	21	19	—	—	6	22	23	D8	—	—	—	—	99	23	59	17	1	26	78	188	2 2	—	(b) 28.2 oz.
		Co. Tipperary.	,,	346	5 8	7 12	1	21	20	19	19	11	8	—	—	—	—	—	99	88	10	1	—	42	126	238	2 5	—	
			,,	347	4 12	5 12	—	1	16	15	17	18	20	22	22	19	21	9	180	164	16	—	2	17	51	421	2 5	—	(c) 1,677 Points
			,,	348	4 8	6 4	—	4	20	13	15	20	22	20	20	15	21	8	178	172	6	—	40	24	72	319	2 8	—	

D = Dead.

SECTION V.—ANY NON-SITTING BREED—8 Pens.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1946	No. of Bird	Weight: On Arrival lb.	Weight: On Arrival oz.	Weight: At Close of Test lb	Weight: At Close of Test oz.	Production per Period: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct 1–Dec. 23	Full Period	Average Weight of Eggs oz.	dr	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
1	88	*White Leghorn*	March 8	559	4	6	5	0	18	20	19	7	8	24	26	25	28	24	22	12	233	39	157	37	—	21	63	471	2	2	—	(a) 1,270 Eggs
		Mrs. P. Walton,	,,	560	4	8	5	8	16	20	20	18	21	22	26	26	19	21	21	9	239	54	163	22	—	37	111	521	2	2	—	
		Ashtown Lodge,	,,	561	4	8	5	4	20	6	—	18	20	21	23	25	21	20	26	13	213	47	146	20	—	6	18	451	2	2	—	(b) 26.0 oz
		Castleknock,	,,	562	4	10	5	12	19	18	22	18	24	21	21	14	8	—	8	7	180	73	102	5	2	54	162	415	2	3	—	
		Co. Dublin.	,,	563	4	0	5	0	—	—	6	21	18	20	21	19	21	20	19	9	174	128	46	—	—	6	18	402	2	4	—	(c) 2,763 Points
			,,	564	4	12	6	0	18	3	8	21	23	25	26	28	22	21	24	12	231	143	73	15	—	14	42	503	2	4	—	
2	89	*White Leghorn*	Feb. 10	565	4	12	6	12	11	1	5	5	4	3	4	3	8	4	—	—	48	45	2	1	19	17	51	73	2	7	—	(a) 1,148 Eggs
		Sister-in-Charge,	,,	566	4	4	5	12	23	17	17	6	10	21	25	22	20	22	24	9	216	126	87	3	—	56	168	537	2	3	—	
		St. Martha's College,	Feb. 22	567	3	12	5	0	19	19	15	16	12	19	23	18	23	18	18	9	209	83	114	12	1	46	138	481	2	3	—	(b) 26.5 oz
		An Uaimh,	,, ,,	568	4	7	6	0	21	5	12	17	18	16	23	21	19	22	18	11	203	110	91	2	1	38	114	488	2	3	—	
		Co. Meath.	,, 14	569	4	3	6	12	22	22	20	15	14	19	23	25	23	22	22	9	236	203	32	1	—	63	189	586	2	5	—	(c) 2,705 Points
			,,	570	3	10	4	14	19	23	14	13	18	19	25	26	23	26	20	10	236	71	146	19	—	55	165	540	2	2	—	
3	87	*White Leghorn*	Feb 1	553	3	10	4	8	18	18	20	20	20	23	26	26	27	25	24	10	257	19	215	23	—	43	129	567	2	1	—	(a) 1,176 Eggs
		Mrs. M. O'Shea,	,,	554	3	13	5	4	16	21	17	17	17	18	22	26	19	15	20	11	219	156	58	5	—	50	150	524	2	4	—	
		Farrantane,	,,	555	4	2	6	13	14	—	—	10	19	21	20	25	23	23	19	9	183	177	6	—	—	14	42	431	2	7	—	(b) 26.9 oz.
		Castlegregory,	,,	556	4	0	5	0	19	9	16	20	23	22	24	25	26	24	23	11	242	117	115	10	3	34	102	549	2	3	—	
		Co. Kerry.	,,	557	3	13	4	12	12	11	21	22	21	18	14	14	15	11	11	7	177	38	128	11	74	37	111	222	2	2	—	(c) 2,522 Points
			,,	558	3	12	D		4	20	14	14	16	16	d14	—	—	—	—	—	98	97	1		2	38	111	229	2	9	—	
4	98	*White Leghorn*	Feb. 12	589	3	14	4	12	19	15	18	10	13	16	17	18	13	11	4	6	160	132	25	3	1	50	150	382	2	5	—	(a) 1,059 Eggs
		Mrs. M. E. Shanley,	,,	590	3	12	4	10	9	7	17	19	15	17	20	16	17	18	22	10	187	103	76	8	—	25	75	433	2	3	—	
		Drumard,	,,	591	3	13	D		3	19	14	16	11	4	19	17	17	16	13	D	149	89	59	1	—	36	108	360	2	4	—	(b) 27.1 oz.
		Dromod P.O.,	,,	592	3	13	4	9	3	17	13	13	18	11	20	17	15	20	20	9	176	174	2	—	—	33	99	434	2	8	—	
		Co. Leitrim.	,,	593	3	13	4	5	7	11	20	19	18	19	20	18	16	20	17	8	193	89	100	4	—	35	105	458	2	3	—	(c) 2,474 Points
			.	594	4	0	5	0	19	20	16	6	3	21	19	21	19	20	18	12	194	155	36	3	29	52	99	407	2	4	—	
5	85	*White Leghorn*	March 1	541	3	12	5	12	16	—	14	13	9	7	24	24	25	6	18	3	139	134	21	4	—	26	78	363	2	5	—	(a) 985 Eggs
		Mrs. L. Forster,	,,	542	3	10	5	0	10	12	—	3	18	16	22	22	20	18	8	1	150	117	28	5	—	17	51	334	2	1	—	
		Tattybrack,	,,	543	3	4	6	0	4	15	6	3	11	9	21	21	17	8	13	1	129	117	10	2	—	23	69	299	2	7	—	(b) 27.2 oz
		Rockcorry,	,,	544	4	10	5	12	22	17	14	6	—	8	14	24	24	26	24	12	191	175	16	—	1	53	159	494	2	5	—	
		Co. Monaghan.	.	545	3	7	4	5	18	10	3	21	18	16	22	19	19	2	—	2	150	16	115	19	1	21	63	285	2	1	—	(c) 2,266 Points
			,,	546	3	10	6	0	10	18	18	15	18	15	20	22	19	21	21	9	206	113	87	6	—	42	126	491	2	4	—	

D = Dead

SECTION V.—ANY NON-SITTING BREED—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1946	No. of Bird	Weight: On Arrival lb. oz.	Weight: At Close of Test lb. oz.	Production per Period: Oct. 1-Oct. 28	Oct. 29-Nov. 25	Nov. 26-Dec 23	Dec. 24-Jan. 20	Jan. 21-Feb. 17	Feb. 18-Mar. 17	Mar. 18-Apl. 14	Apl. 15-May 12	May 13-June 9	June 10-July 7	July 8-Aug. 4	Aug. 5-Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First Grade	Special and First Grade—Oct. 1-Dec. 23	Scoring Points: Oct. 1-Dec. 23	Full Period	Average Weight of Eggs oz. dr.	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
6	86	*White Leghorn* Sister-in-Charge,	March 1	547	4 2	5 2	3	9	18	21	16	18	23	18	20	7	14	10	177	160	16	1	1	29	87	410	2 6	1	(a) 814 Eggs
		R.D.E. School,	,,	548	4 5	D	8	3	17	13	5	D	—	—	—	—	—	—	46	30	16	—	2	28	81	115	2 5	—	
		Swinford,	,,	549	4 7	5 9	18	18	13	—	14	8	13	21	23	17	13	—	158	92	60	6	2	45	135	375	2 3	—	(b) 27.0 oz.
		Co. Mayo.	,,	550	4 5	5 0	21	20	18	7	7	20	25	21	7	—	—	—	146	33	104	9	—	50	150	324	2 2	—	
			,,	551	4 10	5 14	9	11	—	10	12	8	5	2	—	—	2	—	59	57	2	—	5	20	60	128	2 9	—	(c) 1,885 Points
			,,	552	3 15	5 0	20	21	7	12	21	19	23	24	24	22	23	12	228	136	82	10	—	40	120	533	2 3	—	
7	96	*White Leghorn* Mrs. S. Jones,	April 28	571	3 12	4 12	—	11	19	14	16	16	17	19	20	18	16	7	173	11	85	77	—	—	—	229	2 0	—	(a) 907 Eggs
		Baldungan,	,,	572	4 0	4 5	11	6	11	13	17	16	13	9	16	18	16	8	154	35	72	47	1	—	—	254	2 1	—	
		Skerries,	,,	573	3 14	4 10	16	14	16	12	17	15	17	19	15	16	18	10	185	91	75	19	—	30	90	406	2 3	—	(b) 24.7 oz.
		Co. Dublin.	,,	574	3 12	D	d10	—	—	—	—	—	—	—	—	—	—	—	10	—	—	10	—	—	—	—	1 10	—	
			,,	575	3 12	4 0	9	21	18	20	18	20	17	23	19	17	22	10	214	10	109	95	—	1	3	279	1 15	—	(c) 1,567 Points
			,,	576	3 9	4 4	6	13	14	16	19	17	20	15	12	15	15	9	171	87	79	5	—	28	84	399	2 3	—	
8	97	*White Leghorn* Rev. Bro. Dominick,	March 12	583	3 2	D	—	—	11	17	10	15	14	15	20	—	D	—	102	25	73	4	—	9	27	205	2 2	—	(a) 626 Eggs
		Agricultural College,	,,	584	3 13	5 0	12	17	19	16	15	14	17	15	12	10	5	4	156	22	83	51	1	5	15	232	2 0	—	
		Mount Bellew,	,,	585	3 7	4 4	—	—	12	13	15	11	16	13	6	—	—	—	89	18	67	4	—	10	30	180	2 2	—	(b) 24.9 oz.
		Co. Galway.	,,	586	3 12	D	13	16	4	—	—	D	—	—	—	—	—	—	33	3	18	12	—	21	63	63	1 15	—	
			,,	587	3 11	3 12	7	4	15	14	18	12	19	13	13	16	9	6	146	11	106	29	—	17	51	280	2 1	—	(c) 1,182 Points
			,,	588	3 11	D	—	17	17	12	16	14	17	7	D	—	—	—	100	13	82	5	—	32	96	222	2 2	—	

D = Dead

SECTION VI.– ANY OTHER UTILITY BREED—13 Pens.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1946	No. of Bird	Weight: On Arrival lb	oz.	Weight: At Close of Test lb	oz.	Production per Period: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs oz.	dr.	Number of times Broody	(a) Total Eggs from Pen (b) Average Weight per dozen. (c) Scoring Points per Pen.
1	112	*Light Sussex* Mrs. M. Comerford,	Feb. 23	511	5	0	5	8	16	21	7	9	23	21	25	25	22	17	17	13	216	100	116	—	—	44	132	523	2	3	1	(a) 1,211 Eggs
		Lamogue,	,,	512	5	8	6	8	15	23	17	19	21	23	27	22	17	18	23	8	233	5	69	159	—	30	90	185	1	14	—	
		Windgap,	,,	513	5	9	6	12	25	14	-	15	22	23	28	25	22	7	27	8	216	165	51	—	—	39	117	513	2	4	2	(b) 26.5 oz.
		Thomastown,	,,	514	6	0	6	10	25	21	22	21	24	25	27	28	13	25	18	2	251	235	16	—	—	68	204	615	2	6	3	
		Co. Kilkenny.	,,	515	5	7	6	4	23	17	15	18	18	19	23	23	22	16	15	10	219	180	39	—	1	55	165	532	2	3	—	(c) 2,570 Points
			,,	516	5	14	8	2	19	18	16	6	13	2	2	—	—	—	—	—	76	75	—	1	—	52	156	202	2	7	—	
2	113	*Light Sussex* Sister-in-Charge,	Feb. 28	529	5	5	7	1	5	9	15	12	20	17	17	19	7	21	18	8	168	129	35	4	—	26	78	401	2	4	1	(a) 1,068 Eggs
		St. Mary's Abbey,	,,	530	5	10	6	4	10	—	16	21	19	20	25	23	26	27	21	7	215	73	137	5	6	25	75	485	2	3	—	
		Glencairn,	,,	531	5	14	6	0	8	—	6	17	6	20	11	5	11	13	1	—	98	95	3	—	—	14	42	224	2	9	4	(b) 27.1 oz.
		Co. Waterford.	March 7	532	5	2	6	8	17	23	22	24	17	17	21	11	13	22	11	6	204	157	41	6	—	56	168	491	2	5	2	
			,,	533	5	2	7	0	19	22	23	18	17	21	23	23	22	13	19	10	230	83	139	8	—	56	168	542	2	3	1	(c) 2,524 Points
			,,	534	5	10	6	14	2	20	11	—	—	15	21	23	19	17	16	9	153	133	20	—	—	33	99	381	2	4	—	
3	107	*Light Sussex* Sister-in-Charge,	Jan. 10	487	5	11	6	15	10	23	20	21	17	18	21	22	20	20	15	11	218	37	168	13	—	50	150	504	2	2	—	(a) 1,060 Eggs
		St. Martha's College,	,, ,,	488	7	2	8	0	17	21	13	9	17	18	21	21	21	9	11	10	188	186	2	—	—	51	153	457	2	8	—	
		An Uaimh,	,, 22	489	6	12	7	15	—	—	15	20	18	21	23	17	22	21	17	9	183	179	4	—	10	15	45	408	2	7	—	(b) 28 0 oz.
		Co. Meath	,, ,,	490	6	4	D		19	17	18	13	17	15	20	18	—	—	—	D	137	135	2	—	4	54	162	320	2	6	—	
			Feb. 4	491	6	5	6	10	12	7	—	8	21	25	22	18	23	14	26	2	178	170	8	—	—	19	57	417	2	6	2	(c) 2,458 Points
			Jan. 10	492	5	7	7	8	—	—	—	10	20	19	23	21	23	13	19	8	156	76	80	—	—	- -	—	352	2	3	—	
4	104	*Light Sussex* Mrs. W. O'Neill,	Feb. 20	469	6	9	7	6	18	17	18	13	9	2	22	26	20	20	14	6	185	166	19	—	—	53	159	463	2	5	—	(a) 1,102 Eggs
		Killeen House,	,,	470	6	2	6	6	19	23	19	17	15	15	21	20	16	19	16	9	209	83	120	6	1	61	183	506	2	3	—	
		Ballybricken,	,,	471	6	2	7	10	19	22	23	15	17	18	16	17	1	—	—	—	148	132	16	—	16	64	192	328	2	5	-	(b) 26 8 oz.
		Grange,	,,	472	6	2	6	10	19	23	20	18	14	19	20	15	15	11	15	5	194	12	139	43	34	52	156	286	2	0	—	
		Kilmallock,	,,	473	5	7	6	12	6	21	21	15	20	20	15	19	11	15	7	3	173	167	6	—	3	48	144	413	2	6	1	(c) 2,449 Points
		Co. Limerick.	,,	474	5	13	6	7	22	18	6	25	9	19	25	21	6	21	9	12	193	127	59	7	—	40	120	453	2	3	8	
5	111	*Light Sussex* Miss M. Brett,	—	505	5	0	7	3	—	9	16	19	17	12	21	14	13	17	5	8	151	149	2	—	—	25	75	357	2	10	—	(a) 971 Eggs
		Kylenahone,	—	506	5	0	5	2	21	18	22	21	22	22	26	27	25	12	21	3	240	25	190	25	—	59	177	522	2	1	2	
		Killenaule,	—	507	5	0	6	0	13	23	20	20	19	15	5	—	3	2	11	8	139	114	25	—	1	56	168	353	2	4	—	(b) 26.8 oz.
		Thurles,	—	508	5	0	5	0	—	12	18	17	18	6	13	16	20	9	17	1	147	51	92	4	—	28	84	339	2	3	1	
		Co. Tipperary.	—	509	5	0	6	11	12	22	25	22	19	18	19	10	11	11	11	—	180	113	66	1	-	59	177	438	2	3	2	(c) 2,267 Points
			—	510	5	0	7	4	21	21	17	20	13	10	8	3	—	—	—	1	114	40	65	9	1	50	150	258	2	2	—	

D = Dead.

SECTION VI.—ANY OTHER UTILITY BREED—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1946	No. of Bird	Weight: On Arrival (lb. oz)	Weight: At Close of Test (lb. oz.)	Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov 26–Dec. 23	Dec. 24–Jan 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First Grade	Special and First Grade Oct. 1 Dec. 23	Scoring Points: Oct. 1–Dec. 23	Scoring Points: Full Period	Average Weight of Eggs (oz. dr.)	Number of times Broody	(a) Total Eggs from Pen (b) Average Weight per dozen. (c) Scoring Points per Pen.
6	102	*Light Sussex* Mrs. A. Quilty,	January	463	5 8	6 4	—	—	3	18	21	21	24	20	11	13	22	3	156	139	17	—	—	3	9	353	2 5	1	(a) 962 Eggs
		Nicholastown,	,,	464	5 4	6 12	10	19	19	19	17	19	21	20	18	13	5	8	188	38	137	13	—	47	141	415	2 2	—	
		Mooncoin,	,,	465	6 2	D	16	13	16	11	22	25	D7	—	—	—	—	—	110	49	60	1	2	45	132	258	2 3	—	(b) 26.5 oz.
		Co. Kilkenny.	March	466	6 0	7 12	23	10	18	12	8	10	11	12	21	4	6	—	135	119	16	—	3	51	153	324	2 5	—	
			February	467	6 5	7 8	22	9	—	—	12	22	25	20	23	12	23	5	173	148	25	—	—	31	93	417	2 5	—	(c) 2,208 Points
			,,	468	5 4	6 6	21	20	18	18	20	21	21	16	14	12	15	4	200	26	157	17	1	47	141	441	2 1	2	
7	109	*Light Sussex* Mrs. J. Hely-Hutchinson,	Jan. 23	493	5 10	6 3	—	—	9	25	24	24	25	23	12	18	21	5	186	185	1	—	1	9	27	423	2 7	2	(a) 956 Eggs
		Lissen Hall,	,,	494	5 12	6 1	24	9	17	16	21	17	24	22	15	15	15	—	195	172	23	—	1	50	150	468	2 5	1	
		Swords,	,,	495	5 5	5 8	20	23	21	11	7	20	21	23	—	—	18	2	166	20	128	18	2	51	153	363	2 1	2	(b) 27.2 oz.
		Co. Dublin.	,,	496	5 14	6 11	22	2	9	23	25	24	27	25	12	26	12	—	207	28	169	10	—	28	84	460	2 2	2	
			,,	497	5 15	D	17	16	15	4	—	D	—	—	—	—	—	—	52	50	2	—	3	48	138	144	2 8	—	(c) 2,205 Points
			,,	498	5 12	7 0	17	7	17	19	18	20	21	19	—	—	2	10	150	105	43	2	—	39	117	347	2 5	3	
8	110	*Light Sussex* Mrs. M. Nagle,	February	499	5 11	6 0	7	—	3	16	18	18	19	21	17	14	19	—	152	102	48	2	2	8	24	337	2 4	1	(a) 1,017 Eggs
		Springmount,	,,	500	5 13	6 4	18	21	21	17	16	19	21	17	19	9	19	7	204	11	117	76	41	31	93	238	2 0	—	
		Mallow,	,,	501	5 10	6 0	20	20	19	19	18	17	17	16	18	15	13	6	198	107	88	3	1	56	168	478	2 3	—	(b) 26.3 oz.
		Co. Cork.	,,	502	5 9	6 8	4	—	—	8	15	17	17	19	18	20	20	8	146	145	1	—	—	4	12	344	2 7	—	
			,,	503	5 11	6 12	13	18	15	16	15	20	20	20	18	20	19	6	200	58	138	4	25	44	132	426	2 2	—	(c) 2,069 Points
			,,	504	5 7	D	7	—	12	20	19	19	18	17	D5	—	—	—	117	27	89	1	2	18	54	246	2 2	—	
9	101	*Light Sussex* Miss E. Dixon,	Jan. 28	457	5 4	6 0	18	10	5	16	11	21	21	10	9	13	13	—	147	97	47	3	—	31	93	344	2 3	4	(a) 1,000 Eggs
		Roseville,	,,	458	5 5	6 13	21	24	19	14	20	9	14	10	12	3	17	4	167	100	61	6	—	58	174	404	2 4	—	
		Enniskeane,	,,	459	5 4	7 0	14	10	16	10	14	15	13	12	18	15	11	6	154	92	59	3	1	37	111	368	2 3	—	(b) 25.9 oz.
		Co. Cork.	,,	460	5 14	7 12	27	7	21	20	23	23	20	20	15	7	16	5	204	22	115	67	—	16	48	316	2 0	—	
			,,	461	5 4	D	23	20	17	15	18	20	18	18	9	16	7	D	181	115	58	8	1	52	156	418	2 4	—	(c) 2,058 Points
			,,	462	5 10	7 9	7	11	7	21	21	19	21	17	4	1	11	7	147	22	65	60	—	15	45	208	2 0	—	
10	115	*Buff Rock* Mrs. A. Coleman,	March	517	5 0	5 8	21	17	22	19	18	4	22	16	12	20	7	11	189	39	128	22	—	43	129	413	2 2	2	(a) 904 Eggs
		Ballycullen House,	,,	518	5 6	5 15	13	17	18	14	16	16	18	21	17	7	21	9	187	147	36	4	—	44	132	447	2 5	1	
		Croom,	,,	519	5 0	5 14	9	12	20	19	18	9	—	—	—	—	—	—	87	25	54	8	—	33	99	191	2 2	—	(b) 26.1 oz.
		Co. Limerick.	,,	520	5 0	5 13	5	9	10	16	19	19	19	19	15	11	2	—	144	104	35	5	1	19	57	308	2 4	—	
			,,	521	5 0	6 6	—	13	20	4	17	13	19	14	9	14	11	8	142	47	89	6	—	31	93	335	2 3	1	(c) 1,974 Points
			,,	522	5 1	4 0	12	2	18	19	21	20	18	13	—	19	13	—	155	26	92	37	—	14	42	280	2 1	2	

D = Dead.

SECTION VI.—ANY OTHER UTILITY BREED—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1946	No. of Bird	Weight: On Arrival (lb. oz.)	Weight: At Close of Test (lb. oz.)	Production per Period: Oct. 1-Oct. 28	Oct. 29-Nov. 25	Nov. 26-Dec. 23	Dec. 24-Jan. 20	Jan. 21-Feb. 17	Feb. 18-Mar. 17	Mar. 18-Apl. 14	Apl. 15-May 12	May 13-June 9	June 10-July 7	July 8-Aug. 4	Aug. 5-Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring, Special and First Grade	Special and First Grade—Oct. 1-Dec. 23	Scoring Points: Oct. 1-Dec. 23	Full Period	Average Weight of Eggs (oz. dr.)	Number of times Broody	(a) Total Eggs from Pen (b) Average Weight per dozen. (c) Scoring Points per Pen.
11	105	*Light Sussex* Sister-in-Charge,	—	475	5 10	6 2	9	13	22	16	20	17	21	14	10	13	15	—	170	16	128	26	1	24	72	336	2 1	2	(a) 998 Eggs
		Drishane Convent,	—	476	5 4	7 1	15	21	—	14	20	18	22	21	10	16	17	—	174	—	55	119	—	5	15	130	1 14	3	
		Millstreet,	—	477	5 1	6 8	—	18	21	11	19	16	19	16	12	9	10	4	155	20	121	14	9	31	93	312	2 1	—	(b) 25.5 oz.
		Co. Cork.	—	478	5 7	6 8	—	—	10	23	21	20	21	22	11	15	20	—	163	77	81	5	—	10	30	360	2 3	2	
			—	479	5 8	7 11	17	19	20	16	23	22	23	14	18	12	10	5	199	114	78	7	—	50	150	461	2 3	—	(c) 1,907 Points
			—	480	5 14	D	22	21	19	13	13	14	20	14	D1	—	—	—	137	128	9	—	14	62	186	308	2 5	—	
12	116	*Buff Rock* Mrs. M. A. Walshe,	—	523	5 0	6 4	—	—	12	14	15	14	17	11	9	14	7	7	120	113	7	—	—	12	36	280	2 7	—	(a) 819 Eggs
		Tullamore,	—	524	5 0	5 8	—	11	5	—	18	16	20	21	10	13	6	6	126	109	17	—	—	16	48	293	2 5	1	
		Listowel,	—	525	5 0	D	16	15	17	17	20	23	21	23	21	6	D	—	179	177	2	—	—	48	144	412	2 7	—	(b) 28.5 oz.
		Co. Kerry.	—	526	5 0	D	16	7	D	—	—	—	—	—	—	—	—	—	23	—	9	14	—	9	27	27	1 14	—	
			—	527	5 0	5 8	5	16	18	19	16	17	23	22	16	14	14	4	184	117	67	—	1	39	117	437	2 4	—	(c) 1,887 Points
			—	528	5 0	6 0	—	13	20	17	22	19	21	22	22	18	13	—	187	183	4	—	—	33	99	438	2 8	—	
13	106	*Light Sussex* Mrs. E. B. Wilson,	Feb. 10	481	5 3	7 8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	(a) 579 Eggs
		Hermitage,	,,	482	5 4	7 8	—	—	—	14	16	16	18	17	16	—	—	—	97	88	8	1	—	—	—	192	2 5	—	
		Newtownm'tkennedy,	,,	483	5 13	7 12	—	6	17	12	19	16	19	21	24	20	18	9	181	181	—	—	1	23	69	429	2 9	—	(b) 28.3 oz.
		Co. Wicklow.	,,	484	5 12	6 12	10	—	—	—	—	—	—	—	—	—	—	—	10	—	—	10	—	—	—	—	1 12	—	
			,,	485	5 3	6 6	18	20	20	13	11	12	5	—	—	—	—	1	100	5	65	30	2	30	84	162	2 0	—	(c) 1,256 Points
			,,	486	5 7	7 8	12	21	11	—	9	18	24	25	20	21	19	11	191	184	6	1	1	44	132	473	2 7	—	

D = Dead.

BLIND-SEED DISEASE OF RYE-GRASS

By

H. A. LAFFERTY, D.Sc., F.R.C.Sc.I.

INTRODUCTION.

The development and vitality of agricultural seeds depend largely on the weather experienced during the flowering stage of the plant and during the harvesting of the crop, and since climatic conditions vary from year to year it follows that the average germination of any kind of seed must, of necessity, show annual variations within, at times, rather wide limits. Adverse weather conditions are only too obvious, and when seed of low germination is found following an unfavourable summer and autumn the trouble may, as a rule, be correctly attributed to "weathering."

Similar views were held by Foy (1) in New Zealand with regard to the variable quality of perennial and Italian rye-grass seed produced there, but by 1927 it became increasingly clear that the germination of seed from the Otago, Manawatu, and Southern districts was so consistently poor that it could not be attributed entirely to weather conditions.

In 1932 Hyde (5), working with New Zealand material, reported that a microscopic examination of samples of rye-grass seed of low germination revealed the presence of fungus mycelium in the tissues of the dead kernels (caryopses) and masses of spores on their surface. This observation led to mass spore-culture infection trials on healthy flowering rye-grasses, and the recovery of dead and infected seeds from the inoculated plants. At this stage the fungus was believed to be a species of *Pullularia*. By 1939 seeds of pedigree strains of New Zealand rye-grasses were found to be heavily infected with what appeared to be a similar fungus, and the matter was further investigated by Neill and Hyde (7) who referred to the trouble as the "Blind-seed Disease."

In the same year (1939) Noble (9), in Scotland, found a disease on rye-grass seed from Ayrshire, Aberdeen, and Ireland. The exact source of the Irish material was not stated but it was probably of Northern origin. She described the colour characteristics of the infected caryopses and from them she isolated a fungus which resembled *Pullularia pullulans*. Later some doubt was cast on the identity of the causative organism when Wilson, Noble and Gray (10), in 1940, reported the presence of *Pullularia pullulans* and also the blind-seed fungus on one and the same seed from English-grown material.

The first Irish record of the disease is that of Muskett and Calvert (6) in 1940, who found it on a sample of rye-grass seed from a pedigree strain (S. 23) of very low germination. These workers confirmed earlier reports in that they found two distinct fungi commonly associated with the dead seeds: a yeast-like organism which they identified as *Pullularia pullulans*, and which they proved by pure-culture inoculations to be non-parasitic, and a fungus whose macrospores were commonly found on the surface of the dead seeds. The latter fungus was also isolated in pure-culture and inoculation trials on rye-grass plants showed that it was capable of causing the death of the developing seeds. It was further shown to produce apothecia on dead seeds, and these bodies were identical in appearance with those described by Neill and Hyde when they provisionally placed the organism in the genus *Helotium*. Using ascospores liberated by the apothecia, Muskett and Calvert successfully infected rye-grass plants at the time of flowering. From this, and work of a similar nature carried out elsewhere, it was clear that while *Pullularia pullulans* was often present on dead rye-grass seed it was not the cause of the trouble, and furthermore, that while the causative fungus was now easily identifiable from its growth characteristics, its nomenclature remained a matter of some doubt. According to Muskett and Calvert the disease was found occurring naturally in Northern Ireland on fiorin (*Agrostis palustris*), bentgrass (*Agrostis canina*), sheep's fescue (*Festuca ovina*), smooth-stalked meadowgrass (*Poa pratensis*), Yorkshire Fog (*Holcus lanatus*) and crested dogstail (*Cynosurus cristatus*), while meadow fescue (*Festuca pratensis*), and rough-stalked meadowgrass (*Poa trivialis*) were successfully infected with pure-cultures of the fungus from perennial rye-grass.

In New Zealand the disease has been recorded on tall fescue (*Festuca arundinacea*), meadow fescue, and Chewings fescue (*Festuca rubra var. fallax*), and to this list may be added darnel (*Lolium temulentum*) as a host plant in the U.S.A.

Glassock (2) reported the disease from the South of England in 1940, and in 1942 Gray (3), in Scotland, provisionally named the fungus *Phialea mucosa* n.sp. About this time Neill and Hyde (8) suggested that the fungus responsible for the blind-seed disease was identical with *Phialea temulenta*, which had been discovered by Prillieux and Delacroix in 1891 as a parasite on rye in France: a suggestion which is now generally accepted.

According to Hardison (4), the disease was first recorded by Fischer in the U.S.A. in 1944, where it was found on rye-grass seed samples submitted for test to the Seed Laboratory at Corvallis in Oregon. As this State is largely interested in rye-grass seed-production, as distinct from pasture development, the appearance of the disease had serious repercussions on the agricultural economy of the Oregon farmers where, as has been mentioned by Hardison, "nearly one-seventh of the 1948 crop had less than 70% germination and represented practically unsaleable seed."

DESCRIPTION OF THE DISEASE.

In collecting material for this article, which deals primarily with the identification and distribution of the disease in the twenty-six southern counties of Ireland, work of a cultural or mycological nature was not undertaken. Consequently the life-history of the parasite was not followed in all its details and the course of the disease, as described here, is based on the agreed reports of earlier workers.

When a dead rye-grass seed, infected with *Phialea temulenta* and of the previous season's crop, is sown in a grass-seed mixture in spring it does not decay immediately as is the case with other non-infected dead seeds. On the contrary it remains relatively firm, and the fungus, in the presence of soil moisture, resumes active growth and within a short time produces masses of microconidia between the glumes and the kernel. The function, if any, of these spores in the life-history of the fungus is at present unknown. Approximately twelve months later, if the dead seed has not been buried too deeply in the soil, small saucer-shaped mushroom-like growths (apothecia), each about one-quarter of an inch in diameter, are produced on mycelial stalks which arise from the infected seed and appear above ground. These apothecia give rise to a second type of spores (ascospores) which, when ripe, are liberated in intermittent puffs and are carried by wind to the flowers and ovaries of neighbouring rye-grass plants. There they germinate and produce mycelium which invades the tissues of the developing seeds, many of which are killed as a result. Within a further few days, the mycelium in the recently killed seeds produces a gelatinous mass of yet a third kind of spore (macroconidia) on the surface of the dead kernels, and these are washed by rain on to other seeds developing further down the flowering-head of the plant. These seeds, in turn, become infected and when such a crop is harvested for seed the sample contains dead and diseased seeds and in this way the life-cycle of the fungus is completed. It is important to note, in this connection, that the fungus is described as being incapable of attacking any part of the rye-grass plant other than the seed.

To agriculturalists on the look-out for this trouble in the field, the popular name "blind-seed disease" may be slightly misleading since it may be confused with an abnormal condition in oats known as "blindness." In the case of the blind-seed disease in rye-grasses the seeds are partially or completely developed before infection takes place, and as the seed-heads and the seeds look normal it is quite impossible to identify the disease with the naked eye. This can only be done with certainty by removing the glumes from the seeds and examining the caryopses in drops of water under the microscope, when masses of macroconidia will be seen in abundance in the surrounding liquid. In some cases these spores are present in such numbers that the water becomes quite turbid in appearance.

Normal caryopses of healthy rye-grass seeds are plump in shape and golden-yellow in appearance, while infected specimens are usually shrivelled and greyish-brown, or plump and mahogany-coloured ; but such variations exist in shape, colour, and degree of infection, that visual appearances alone are quite useless as diagnostic characters.

THE DISEASE IN IRELAND.

With the foregoing information available a rather cursory examination was made of samples of perennial and Italian rye-grass seeds reaching the Seed Testing Station of the Department of Agriculture. The samples, which were of the 1944 crop, were selected at random and after a few negative trials the disease was found on seed grown in Co. Donegal, Co. Monaghan, Co. Kerry and Co. Wexford. The degree of infection in the samples varied from a trace to 10%, and as the germination of the affected seeds was reasonably good the matter was not investigated further at that time.

In the autumn of 1947, however, fourteen samples of non-machined Italian rye-grass seed grown by different farmers in Co. Wexford, from a common bulk of a certified New Zealand strain, were received for germination and purity tests. As was to be expected the purity figures for these lots were low, as the samples had not been cleaned, but contrary to expectation the germination results were also disturbingly low and, as the various lots showed no signs of weathering, they were examined microscopically for the presence of the blind-seed fungus as a possible explanation of their poor quality. With one exception, spore masses of *Phialea temulenta* were found in abundance on the caryopses of all lots, and in the accompanying table will be found the germination figures for the various samples and the approximate percentage of infection in each case.

TABLE I.

Showing the germination and approximate degree of infection of fourteen seed-crops of Italian rye-grass, purported to have been grown on different farms from the same original bulk of seed.

GERMINATION %	INFECTION %
46	40
59	50
58	30
45	50
36	40
51	20
46	30
39	30
64	20
64	20
68	10
73	10
75	10
81	0

In connection with the figures appearing in Table I., it is necessary to re-emphasize the fact that the samples were from unmachined lots and contained many "light" or poorly filled seeds, which would eventually be removed during the cleaning process. Furthermore, as many of these partially developed seeds were in this condition by virtue of the fact that they were killed at an early stage of development, the final cleaned products would in all probability show higher germination and lower infection figures than those recorded. As it was not possible to examine these lots of seed after final cleaning this point could not be definitely established.

Considering the experimental material in the state in which it was received, the results indicate that the low germination figures obtained for the majority of the samples were directly connected with the high incidence of the disease. Since, however, one sample was of reasonably good quality and showed no infection, and since all crops were described as having been grown from the same original bulk of seed, the question must necessarily arise as to whether the original seed carried the disease, or whether the resulting crops became infected from outside sources. Some support is lent to the latter possibility since, as previously mentioned, the disease was found in Co. Wexford in 1944. Furthermore, seed submitted by four other contracting farmers in different parts of the country, from crops purporting to be from the same original bulk of seed as the Co. Wexford lot, showed germinations of 87%, 81%, 80%, and 48%, with 0%, 0%, 0% and 20% of infected seed respectively. As it was not possible to examine the original bulk of seed the question of its condition at the time of sowing must remain in doubt, but there are strong grounds for suggesting that infection of rye-grass seed-crops from adjoining infected rye-grass pastures, and from infected rye-grasses growing on headlands, roadsides and similar waste places, cannot be completely ignored. Again, where infected rye-grass pastures are broken up for a cereal crop and undersown with Italian rye-grass to be harvested as a seed-crop, primary infection may arise from the apothecia developed from diseased seed shed by the pasture rye-grasses.

To get some idea as to the prevalence of blind-seed disease in Irish-grown commercial rye-grasses from the seed growing areas, a total of four hundred and sixty-four samples of seed received at the Seed Testing Station in the year 1947-48 were microscopically examined. These samples consisted of perennial, Italian, and mixtures, but since both these varieties are equally susceptible to the disease all rye-grass samples were grouped together and treated as a whole. As in earlier tests the glumes were removed from twenty seeds, taken at random from each sample, and the naked caryopses examined microscopically in drops of water. If the first batch of twenty seeds revealed a certain number of infected specimens the figure was recorded as an approximate percentage, but if the results were negative a further and final lot of twenty seeds were examined and the findings recorded. Owing to the relatively small number of seeds examined, the results can only be

regarded as rough approximations, but in two test cases where the recorded infection figures were 20% and 25%, an examination of 500 seeds of each lot revealed infections of 17% and 29% respectively.

The degree of infection varied from sample to sample, the extremes being a trace to 60%, and of the total number examined 64.2% showed infection to a greater or lesser extent. As in earlier trials the germination of the various samples bore a close correlation to the amount of disease present, but occasionally samples of very low germination were found to be free from the trouble. In a few of these cases inquiries were made from the senders regarding these samples, and in every instance it was learned that the seeds had been held over from the previous season, so that their low quality could be attributed to age and possibly to unsuitable storage conditions. The disease was found in rye-grass seed grown in the Counties of Donegal, Cavan, Louth and Monaghan, which are the chief seed-growing areas, and it was also identified in small lots of home-saved seed from Co. Kerry and Co. Wexford.

Since *Phialea temulenta* is to a large extent dependent for its spread on wet weather during the flowering of the rye-grass plants, it might be argued that the seed from the 1947 crop may not have been representative of Irish seed-crops in other years. To settle this point a number of samples of rye-grass seed from the 1948 harvest were examined, and of these approximately 70% carried the infection. This figure, though only an approximation, is in sufficient agreement with the figure of 64.2% obtained for the 1947 crop as to suggest that between 60% and 70% of the Irish rye-grass crops are annually infected with the blind-seed fungus.

DISTRIBUTION OF THE DISEASE.

Seeing that most of the rye-grass seed used for home consumption is grown in the Counties of Donegal, Cavan, Louth and Monaghan, and that the disease was present in stocks from these sources, it was natural to suspect that a survey of the twenty-six southern counties would show that the fungus was widely distributed over the country. Through the co-operation of the Agricultural Instructors in 1947 and 1948, samples of rye-grass seed-heads were obtained and examined. These specimens were collected over wide areas from pastures one year old and over, including in some cases pastures over twenty years old, and also from roadsides and other waste places. In all one hundred and nine samples were received from twenty-four counties and the disease was identified on seed from twenty-one of these. The three counties from which the disease was not identified on the specimens submitted were Kilkenny, Roscommon and Longford, but there is no reason to believe that this is other than an accident in sampling.

It is of interest to note, in passing, that sclerotia of "Ergot" were found in almost every sample examined, and that specimens from roadsides and waste places carried particularly heavy infections of this fungus.

TABLE II.

Showing details of the distribution of blind-seed disease throughout the twenty-six southern counties of Ireland.

County	Seed from Rye-grass Seed-Crops	Seed from Pastures	Seed from Waste Places
Donegal	X	NS	NS
Cavan	X	X	NS
Monaghan	X	X	NI
Kerry	X	NI	X
Wexford	X	X	NI
Louth	X	X	NI
Offaly	NS	X	X
Cork	NS	X	X
Clare	NS	X	X
Waterford	NS	X	X
Tipperary	NS	X	X
Leix	NS	X	X
Galway	NS	X	X
Westmeath	NS	X	X
Mayo	NS	X	X
Dublin	NS	X	X
Limerick	NS	X	NI
Meath	NS	X	NI
Sligo	NS	X	NI
Leitrim	NS	X	NI
Wicklow	NS	NI	X
Kildare	NS	NI	X
Roscommon	NS	NI	NI
Longford	NS	NI	NI
Kilkenny	NS	NI	NI
Carlow	NS	NS	NS

X—Disease identified on samples submitted.
NI—Disease not identified on samples submitted.
NS—No samples received for examination.

THE DISEASE ON FOREIGN SEED.

For a number of years foreign rye-grass seed was not allowed free entry into this country, but, following on the removal of these restrictions, samples of seed of Danish and New Zealand origin began to reach the Seed Testing Station in considerable numbers during the autumn and winter of 1948. The quality of these samples was excellent, many of them showing purities over 99% and germination figures in the region of 95% as compared with corresponding figures of 96% and 80% respectively for Irish-grown seed.

Since it has been shown earlier that there was a close relationship between germination and the presence of blind-seed disease in Irish material, this matter was further examined in the case of the seed of foreign origin. In

all ninety-nine samples of Danish and fifty-four samples of New Zealand perennial and Italian seed were microscopically examined and the percentage of infected lots was found to be 6% and 26% respectively, with a relatively slight degree of infection in each case.

The fact that high-quality rye-grass seed, with low infection rates of *Phialea temulenta,* is now readily available in this country is a matter of supreme importance, but the best use will not be made of these stocks if they are allowed to pass direct into pasture mixtures at this stage. They should be reserved as nuclear stocks for the seed-growing areas, and in this way supplant the relatively poor quality seed that is being produced there at present.

EARLY RECORD OF THE DISEASE.

Though rye-grass seed of low germination has been noticed in New Zealand since the early twenties of the present century, the earliest authentic record of the appearance of *Phialea temulenta* in those islands is that of Wilson and his colleagues, who found it on seed of the 1934 harvest, which was the oldest stock available to these workers.

It is interesting to record in this connection that the late Dr. Pethybridge, as Director of the Irish Seed Testing Station, made collections of rye-grass seed of various qualities which he found in general use in this country in 1910. Among this collection were loft-sweepings, which were sold in the more backward parts of the country as "White Hayseed," "Brown Hayseed." or "Common Hayseed," and perennial and Italian seeds of such low bushel-weights as 10 lbs., 12 lbs., and 14 lbs. Since the collections were made in 1910 the seed must have come from the 1909 crop at the very latest, and since these bulks were either uncleaned or improperly cleaned they contained, among other things, large amounts of "light" or shrivelled seed. During the course of the present survey it was argued that if the disease was present in Ireland in 1909, Pethybridge's collections with their large content of "light" and shrivelled seed would be excellent material for examination. Accordingly, this material was microscopically examined and the macroconidia of *Phialea temulenta* were found in every sample; thus proving that the disease is one of long standing here since this record antidates earlier records by some twenty-five years.

GERMINATION OF INFECTED SEED.

It is not proposed to reopen, in detail, the controversy of long standing on the relative merits of the so-called "Irish" and "Continental" methods of testing seeds of the grasses. According to the former method, "light" and shrivelled seeds are regarded as "pure seed" and as such are tested for

germination; whereas these seeds are regarded as impurities, and removed as such, during a Continental method test. The final effect of this difference in interpretation is that in a test of a rye-grass sample, containing a large amount of "light" or shrivelled seed, the purity result as determined by the Irish method is relatively high and the germination figure low; while in the case of a Continental test of the same sample the position is reversed. Since the germination of a sample of seed is often wrongly considered as being more important than its purity, the low purity obtained by the Continental test may be overlooked if the germination of the selected plump well-developed seed is high. On this account, it is possible for a sample to pass as satisfactory when evaluated on the Continental figures, and be regarded as very inferior when judged by results obtained by the Irish method. Furthermore, since shrivelled seeds and the blind-seed disease have been proved to be intimately connected, it is the opinion of the writer that the presence of the disease is more likely to be brought into prominence during tests if these seeds are dealt with according to the Irish method.

Owing to the great advances that have been made in perfecting seed-cleaning machinery much of the "light" and shrivelled seed is now removed from Irish rye-grass seed. Since, however, plump fully-matured seed may also carry infection and, as has been reported by other workers, be capable in some cases of germinating and producing seedlings, it was decided to investigate this matter further and find out the approximate percentage of these infected seeds which are alive, and able to germinate under optimum conditions. To do this a sample of infected perennial rye-grass seed of the 1948 crop was examined microscopically, and from it 100 infected seeds were obtained and put to germinate under laboratory conditions. By the end of the test period 10% of these seeds had produced seedlings, some of which were normal in appearance, but others were so feeble that it is questionable if they would become established plants under field conditions.

In another case 200 seeds, taken at random from a sample of perennial seed whose laboratory germination was 70%, were microscopically examined and subdivided into 138 healthy (disease not identified), 58 diseased, and 4 empty seeds. These were put to germinate, and the final results showed that of the healthy seed 130 germinated, of the diseased seed 5 germinated, and of the empty seed, as was to be expected, none germinated. The final germination result (67.5%) was in reasonably close agreement with the laboratory result (70%), and confirms earlier findings that only a very small percentage of infected seeds are capable of germination even under the best possible conditions. Consequently a high content of infected seeds in a current year's sample may be taken as an indication that its germination will probably be low. One cannot however reduce the matter to simple mathematics and attempt to forecast what that figure may be by working on a formula such as:—100% less the percentage of diseased seed, since the non-infected seeds may be old, or alternatively, may contain a greater or lesser number of seeds which have died from climatic or other causes.

CONTROL OF THE DISEASE.

While certain attempts to control blind-seed disease under laboratory conditions have yielded promising results, no satisfactory method has yet been found to control the disease in the field. Two problems arise here. First, complete disinfection of the dead and diseased seed, including the killing of the mycelium *within* the tissues of the caryopses ; and secondly, the ease with which infection may creep into a seed-crop from infected plants growing in the immediate neighbourhood. Muskett and Calvert claim success in laboratory disinfection trials by using a hot-water treatment at 50 C. for 30 minutes, but they add that seed treated in this way and sown in the field eventually showed a heavy degree of infection which originated from outside sources. These and other workers have reported that *Phialea temulenta* cannot survive longer than approximately two years on infected seeds, a fact that might hold out some encouragement if outside infection could also be eliminated, but since this is impossible it would seem that any hope for controlling this disease in the future must come from the breeding of resistant strains of these grasses. Unfortunately the majority of the pedigree strains in use to-day appear to be more susceptible than commercial strains, but it should be borne in mind that when these pedigree strains were being developed *Phialea temulenta* had not been identified as a parasite of rye-grass, with the result that the question of their resistance or susceptibility to this disease did not arise.

In conclusion, the writer wishes to record his indebtedness to Professor R. McKay of the Plant Disease Department of University College, Dublin, for placing at his disposal literature on this subject that would not otherwise have been available, and for confirming the identification of *Phialea temulenta* on the 1909 Irish material.

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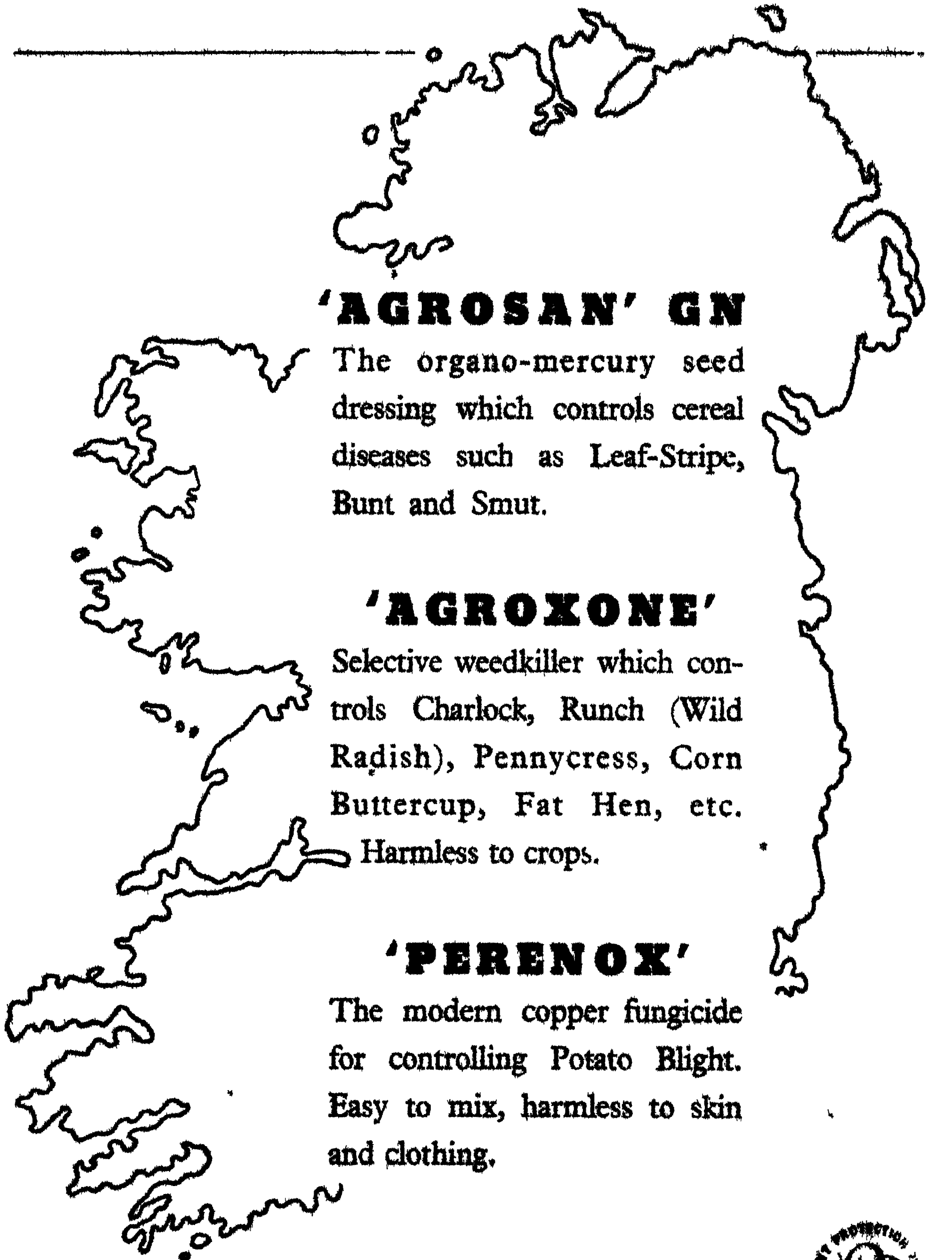

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CONTENTS

MINERAL DEFICIENCY IN PASTURE HERBAGE AFFECTS ANIMAL HEALTH AND PRODUCTIVITY

By

E. J. SHEEHY, D.Sc.

While the relationship between the condition of the soil and the productivity of crops has long been realised, the fact that a deficiency of certain minerals in the soil causes unthriftiness, low productivity and ill-health among stock fed on the produce of such deficient soils is not widely known in this country. The greater part of the diet of our grazing animals is the product, both in the form of fresh grazing and as hay or silage, of permanent pastures of which there are some seven million acres. A very large part of this acreage is in need of fertiliser, and accordingly produces far less in the way of animal food than it is capable of doing. So serious is the shortage of some of the essential minerals over much of this wide area that the deficiency is reflected in the composition of the herbage. Stock fed thereon ingest in their daily diet, even when the total volume of food is adequate, an amount of the minerals in question which is insufficient to maintain a degree of productivity and thriftiness commensurate with economic returns and which in many cases falls short of the requirements of the body for the maintenance of good health.

PHOSPHORUS.

Mineral deficiency in soils and in herbage, and in the stock grazing thereon is recorded from various parts of the world including Australia, America, England, India, Holland and South Africa. The work done by O'Donovan and the writer in Offaly (1), (2), (3) brought to light the magnitude of the problem in that county. It was shown that, over wide areas in Offaly the grazing herbage was seriously deficient in phosphate, and a connection was established between this state of affairs and the uneconomic returns from stock. Most of the disorders to which a variety of local names, such as bogcrook and rheumatism, are attached were shown to be due to aphosphorosis, *i.e.*, insufficient phosphate intake by the stock. The symptoms recorded were unthriftiness, tucked up appearance of the body, very slow growth of young animals, low milk yields in cows, the failure of breeding animals to come "in heat" at the usual intervals and consequently small calf crop, stiffness in movement, and in more severe cases overgrown hooves, creaking joints, pains and the development of a pining condition. It was

shown that aphosphorosis could, as had previously been done elsewhere, be successfully prevented and treated both by the feeding of supplementary phosphate in the form of minerals added to the diet of the stock or by the application of phosphate fertiliser to the ground. In connection with the latter the problem of phosphate immobilisation presented itself on some soils.

Curran (4) followed up with a survey of counties Laoighis, Kildare, Meath, Westmeath, Longford, Galway, Roscommon, North Tipperary and Sligo. His survey disclosed the occurrence of cases of pronounced aphosphorosis in every county he visited. It further disclosed the occurrence, over limited areas in some counties and over very extensive areas in others, of incipient aphosphorosis, resulting in poor fertility among cattle, low productivity of adult animals, and slow growth of young stock and causing a semi-pathological condition not sufficiently pronounced to be described as a disease but yet such as to make livestock husbandry uneconomic.

The work of O'Donovan and the writer, and subsequently of Curran, while very incomplete in as far as their survey aspect was concerned, has very clearly demonstrated that there is widespread evidence of phosphate deficiency in the pasture herbage (and hay) in the counties surveyed, and that this phosphate deficiency acts as a serious limiting factor in the production of livestock and livestock products.

Nor is the phosphate deficient herbage confined to the moory lowlands or peaty upland soils. Over the midland counties and west it occurs freely over a variety of soils from light loam to heavy clay and in districts with which high yields of manured tillage crops are associated.

A case of aphosphorosis has recently been revealed in North County Dublin on a farm of good land in the midst of a fertile area. The history of the diagnosis is interesting. The farmer reported the very frequent occurrence of impaction or dry murrain necessitating treatment of several of his herd of cows during the summer of 1948. Twelve of the cows which had calved early in spring had not come "in heat" by the end of June. A few of the cows had developed the habit of chewing at stones, and one was noticed to be very stiff in her movements. The milk yield was lower than was expected from reasonably good cows on apparently good pasture. Examination of the pasture which, in comparison with very much of the permanent grass of this county, appeared satisfactory or at least reasonably so, showed it to contain phosphate to the extent of 0.40 per cent. of P_2O_5. Previous experience in other counties had associated this low level of phosphate in the herbage with the incidence of aphosphorosis. Incidentally, it may be noted that the pasture herbage consisted of a variety of plants including agrostis which was dominant and some rye grass which in comparison with the other grasses was stunted.

Each cow was given 1½ ounces of calcium phosphate mixed with meals per day, and in 6 weeks the usual spectacular recovery, described in the Offaly write-up (3), had taken place. The stiffness had disappeared, milk yield had increased, the impaction had ceased to occur, stone chewing had ceased, and all the cows had come "on heat" and had been mated. It had been noticed that impaction or dry murrain was of frequent occurrence prior to the phosphate feeding in those districts in Offaly where aphosphorosis occurred. Phosphorus has, in the same way as the other essential minerals, a fundamental physiological function in the live body.

The case of aphosphorosis in North County Dublin is cited at length, firstly, because it has not previously been reported, and secondly, to show that phosphate deficiency of the grazing herbage may obtain even in the reputedly good grazing districts.

So far there is no survey evidence of the existence in this country of aphosphorosis outside those counties mentioned above. There is, however, a considerable amount of evidence available in the way of information gleaned from one's own correspondence and from professional men operating up and down the country, that aphosphorosis exists in every county, and that in many parts unsuspected incipient aphosphorosis is responsible for big losses in livestock production. No attempt has been made to estimate the extent of the loss on livestock production throughout the entire country as a result of unthriftiness and low production due to phosphate deficiency in pasture herbage, but the figure apparently runs into millions of pounds per annum.

It has been established that the application of phosphatic fertiliser to land deficient in phosphate raises the phosphate content of the grass and other plants growing thereon. The remedy for aphosphorosis, both pronounced and incipient, is accordingly the spreading on the land of phosphatic fertiliser which at the same time is required to increase the crop output. The areas to be treated are, however, very extensive and quite a period of time will necessarily elapse before the manure distributor has completed even the first round of application. Besides, there are such problems as phosphate fixation in certain soils which require further elaboration before the raising of the phosphate status of all soils by the application of a normal dressing of phosphate can be universally recommended. In the meantime, phosphate in the form of a mineral supplement may be fed to the animal as part of the daily food ration. The evidence is to the effect that tricalcic phosphate in the form of sterilised bone flour, dicalcic phosphate, as well as such very soluble phosphates as sodium phosphate are all effective in this connection. Large animals would each receive 1½ ounces daily of calcium phosphate or its equivalent in the form of about 2 ounces of sterilised bone daily. Smaller stock would be fed anything up to this amount depending on their size and on the degree of deficiency in the food from the pastures.

The references to phosphate deficiency and to the occurrence of aphosphorosis outside this country are fully listed in publications (3) and (4).

SALT.

The necessity for an appreciable intake of salt (sodium chloride) by farm stock has long been recognised. When the supply of salt in the food is inadequate grave consequences follow. Where the inadequacy is such that only a small fraction of the body requirements is supplied, ill-health becomes so pronounced as to call for specific treatment. The grazing stock of this country are, however, seldom or ever so affected, but a lesser degree of salt inadequacy obtains on many pastures causing lack of thriftiness, reduced production, and absence of that degree of health which is indicated by the condition known as "bloom" on the animal. Deficiency of salt is associated with old permanent pastures, and particularly with those which are not closely grazed. It seldom occurs on recently laid down leys. Except on farms where there is a fair proportion of the latter, it is good practice to provide grazing stock with rock salt to lick at, so that they may benefit from an adequate supply of this important food constituent.

COBALT.

A less familiar mineral, deficiency of which in the pasture herbage and hay would appear to be a matter of very considerable economic importance in this country, is cobalt. A specific case has been reported from Co. Sligo (5) where on alkaline land, sheep, some months after introduction, slowly and then progressively declined, extreme debility and emaciation appearing with symptoms of anæmia culminating in death. Ewes which had been on the land for some time were very slow to breed and the lambs after a period of apparent health pined and died with similar symptoms. The administration of cobalt chloride or sulphate at the rate of 5 milligrams per day per adult sheep of the element cobalt produced a spectacular improvement in the appearance of the animals which rapidly gained strength and condition and became restored to normal health. Treated ewes placed with the ram became pregnant five weeks after treatment started by which time œstrus had failed to occur in the case of untreated animals. The affected farm is all of the same soil formation.

Cobalt deficiency in pasture herbage and in the soil has been well known from other countries for a considerable time. It is responsible for "bush-sickness" in New Zealand, "coast-disease" in Australia, "salt-sick" in Florida, "lake-disease" in middle western America, "pine" in Britain, and so on.

While the literature points to the more frequent occurrence of cobalt deficiency among sheep, cattle are also affected. One of the earliest to connect serious ill-health in cattle with a deficiency of cobalt in the pasture herbage was Baltzer, who with his colleagues (6) showed that the general emaciation and depraved appetite and low concentration of hæmoglobin of cattle which characterised the "Lake Shore Disease" was curable by the administration of cobalt. Similar experience has since been reported from many parts of the world both in the case of cattle and sheep, reviews of the literature on the subject appearing in publications by Russell (7), Frazer (8), and Corrie (9).

So far serious cobalt deficiency has been reported to occur only with ruminating animals in which it functions in the rumen, where its presence appears to be required for the elaboration of the B complex group of vitamins (10), (11). For this purpose as little as 1 milligram of the element cobalt per sheep per day or 7 milligrams per week has been shown to be adequate.

An equally effective method of supplying deficient cobalt is to apply it as a dressing on the pasture. In certain parts this has become more or less routine practice. According to the degree of deficiency an annual application of from ½ lb. to 2 lb. per statute acre of cobalt sulphate suffices.

In this country the existence of pronounced cobalt deficiency in the pasture herbage has been demonstrated in at least one centre. It is possible that the deficiency may be fairly widespread. In fact, there is evidence which points in that direction. Sheep farmers know of the advantage of a change of pasture for their animals, and many find it necessary to transfer sheep from certain pastures to others in order to prevent them from declining. In other parts of the country the growth and weight increment and fertility of sheep is considerably below normal. Presumably cobalt deficiency is part of the explanation. At any rate there is evidence that in conditions where the intake of cobalt is inadequate, but where the deficiency is not so pronounced as to cause emaciation or serious decline in condition, the addition of cobalt to the diet appreciably increased the rate of gain of sheep. Keener *et al* (12), for instance, got in New Hampshire an increase of 250 per cent. by supplementing the diet, under such conditions, with cobalt. Significant improvement in fertility has been effected by the supplementary feeding of cobalt to ewes on pastures where casual observation did not point to mineral deficiency. In the hill grazing of Scotland, for instance, Dunlop (13) found that poor fertility was due to deficiency of cobalt and that dosing of the ewes with a salt of cobalt gave earlier lambs and far less barren ewes. It is possible that the poor results with sheep on some of the pasture land of this country, both in as far as weight increase and fertility are concerned, are associated with an inadequate intake of cobalt due to deficiency of cobalt in the pasture herbage. The cessation of progress on pastures from which sheep "require a change" to other grazing very strongly indicates

shortage of cobalt. It is also possible that cobalt deficiency is a contributing factor to the slow growth and low productivity of cattle on certain Irish pastures. The matter is urgently in need of investigation. In the meantime suspected cases of cobalt deficiency may be treated by dressing the pastures with cobalt, or by feeding a cobalt supplement once a week at the rate of 10 milligrams of the element cobalt to adult sheep and smaller amounts to young animals. The cobalt may be fed as chloride, sulphate or carbonate.

COPPER.

The occurrence of another mineral deficiency has been demonstrated in this country in the early months of 1949 in Co. Offaly (14). A heifer, grazing on peaty soil, which showed persistent scouring and had become emaciated and had not responded to vermicidal doses, made a spectacular recovery on the administration to it of copper sulphate. An ounce of copper sulphate was dissolved in a pint of water. An ounce of this solution was given as a drench in a pint of water and a second drench of similar amount was given after an interval of one day. Scouring ceased almost immediately, the faeces assuming normal consistency. After a three weeks' interval slight scouring returned, but a third drench stopped it immediately, and thenceforward the beast made considerable improvement in health and body condition. Subsequently, other animals showing similar symptoms were treated in a like fashion and made the same spectacular recovery.

Copper deficiency in pasture herbage and the successful treatment of both cattle and sheep grazing thereon has been reported from many parts of the world. It occurs in Australia, Holland, Britain, New Zealand, Florida, Sweden, etc. (7), (15), (16), (17), (18). In the majority of, but not in all, cases the copper deficiency has shown up on peaty or moory soils, the residue of cut-away bog, from which type of soil it has been reported in Offaly. While in some countries the deficiency is restricted to limited localities, in others it is fairly widespread, and already control measures have become routine practice. Control is effected by supplying the deficiency and this is done by administering copper sulphate to the individual animals, by providing it in a salt lick, or by applying it as a dressing to the affected pastures. Practically all the peat land of New Zealand, for instance, is deficient in copper. Cattle put on such land grow slowly and are unthrifty with low productivity, animals of all ages being affected. Among calves losses are high. Scouring with resultant loss of condition frequently occurs. In the case of sheep semi-paralysis reflected in an irregular gait in the lambs is a characteristic symptom; bone weakness is also in evidence. Scouring does not necessarily accompany the other symptoms. Referring to copper deficient areas in New Zealand, Cunningham (15) states "on some affected areas acute scouring does not occur, but cattle are unthrifty, poor in condition, slow in development and low in production." Cunningham goes

on to say that "Young stock are affected even more severely than adults and in many cases replacements cannot be reared unless weaned calves are sent away to areas of different soil type. Calves which are reared on copper deficient country develop poorly; as yearlings or two-year-olds they reach a much smaller size than is normal for their breed, and condition is poor even when there is ample feed available." Experience elsewhere is similar. In this country there is a good deal of the unthriftiness, slow development and low productivity among stock on the peaty land of which there is a large proportion, and evidence from other countries suggests that this state of affairs is associated with copper deficiency. When persistent scouring arising from an inadequate intake of copper occurs the deficiency is of a very pronounced order. Where it is less pronounced the slow growth and poor development and low productivity occur. Presumably, some if not a great deal of the low level of livestock economy of the moory and boggy pastures and possibly on some other pastures of this country is accounted for by a deficiency of copper in the grass and hay which form the major part of the diet of stock. The investigation of this relationship is a matter of urgency.

GENERAL.

Mineral deficiency is usually of a multiple nature. Thus, where in this country cobalt insufficiency was found, phosphate was also in short supply in the herbage. The same is true in respect of our copper deficient pastures. Along the south-western seaboard of Australia sheep suffer from a dual deficiency of both cobalt and copper and their food requires to be supplemented by both (19).

Other minerals may occur in insufficient quantity in the pasture herbage. Thus there is a definite iodine deficiency in parts of central America, and the addition of manganese (20) gave positive results on certain soils in Australia. So far there is no definite evidence pointing to the necessity to supplement the diet of grazing animals in this country with iodine or manganese. In the case of the latter, however, crops suffer from a deficiency, and a case for supplementing the diet with manganese may, under certain pasture conditions, yet be established. So far, however, there is no positive evidence.

While all grazing animals suffer from mineral deficiency in the pasture herbage the intensity of effect varies. Thus a phosphate deficiency may cause grave symptoms in cattle and not show up in any pronounced fashion in sheep. This, as shown by Marston (21), is due to the fact that cattle require 2½ times as much phosphate in the herbage as do sheep. The much larger frame of cattle and the fact that they are less selective in their grazing than are sheep are determining factors. In any case, growing animals

tend to adapt themselves to the supply of minerals and to grow at a rate which is related thereto. It is for this reason that, in the case of cattle on phosphate deficient grass, pathological symptoms show up so much more readily in milking and breeding animals than in growing stock. References to phosphate deficiency in relation to horses are less numerous. However, observations in Offaly (3) point to horses suffering therefrom, and according to Russell (7) "horses also are not very susceptible to aphosphorosis, but in areas in South Africa where cattle are affected horses may be of poor stature, and in America cases of lameness and hypophosphataemia in horses which responded to treatment with bone meal have been reported under drought conditions."

A general feature of inadequate mineral intake is a reduction in food intake. Thus on pasture deficient in phosphate or in cobalt this effect is noticeable. It occurs also where there is calcium shortage, a straightforward case of which uncomplicated by other mineral deficiency seldom occurs in pasture herbage, however. The effect on appetite is pronounced, for instance among pigs on a calcium deficient diet. Another general effect of mineral deficiency is a slowing of the peristaltic action of the intestine, causing a definite tendency to constipation and presumably causing impaction also.

The fundamental function of minerals is illustrated by the irregular and delayed breeding and reduced number of offspring from cows and ewes on mineral deficient pastures. Many of the references listed herein report this effect which is again emphasised by Dunlop (22) who obtained remarkable success in this connection by supplementing mineral deficient pastures of Scotland with an appropriate mineral mixture.

Presumably mineral deficiency in herbage and the consequent inadequate intake of minerals predisposes young animals to danger from worm parasite infection. At any rate it has been well established that stock which are well nourished are far less inclined to succumb to worm infection than are stock which are badly nourished. Minerals form an essential portion of the food requirements of farm stock was well as of other animals, and, accordingly, there is *a priori* evidence of the relationship between mineral insufficiency in the diet and animal ill-health arising from worms. Michael (23) makes reference to this connection in as far as cobalt is concerned, and Cunningham (15) states that young cattle on land deficient in copper appear to be more than usually susceptible to infestation by internal parasites.

It is only in recent years that the economic importance of mineral deficiency in the pasture land of this country has been brought to light. As far as investigation and survey have gone, the evidence is to the effect that the potential profits which, because of inadequate mineral intake from many of our pastures, are lost to the stock owners of this country amount to a very large annual figure. They are of such magnitude as urgently to

call for a complete survey of the country with a view to mapping out the location of the mineral deficiencies and to focussing attention on the benefits to accrue from appropriate remedial action.

Deficient minerals may be supplied either by dressing the land or by direct feeding of the stock. In the case of phosphate, deficiency of which is widespread, an application of this fertiliser to phosphate deficient pastures not alone raises the phosphate content of the herbage but also raises its protein content. There is abundance of evidence of this effect from the Offaly investigations (3) and Marston (24) reports success from top dressing grazing land with phosphate in a case where the direct feeding of phosphate gave negative results. Apparently the low protein of the phosphate deficient herbage in that case acted as a limiting factor to progress even where the diet was supplemented by phosphate.

Pending the raising of the phosphate status of all phosphate deficient grazing land, it is essential to feed supplemental phosphate to stock whose diet is largely derived from the fresh or preserved herbage of such land. Where there are other deficiencies such as cobalt or copper either method of supplying the deficient minerals, viz., top dressing the pasture or supplementary feeding, may be adopted.

Where evidence of mineral deficiency in pastures appears and where it is desired to supply the deficiency as a mineral food supplement, the safe practice, pending the identification of the deficiency, is to feed a mineral mixture which contains all those items which may be deficient. Accordingly, a mineral prepared for the purpose of supplementing the diet of grazing animals, or animals whose diet is derived chiefly from pasture herbage, fresh or preserved, should include a very large proportion of some form of calcium phosphate, some salt, and appropriate percentages of cobalt and copper with possibly, on the score of safety, an addition of manganese, magnesium, and iodine. Animals whose diet consists largely of concentrated foods, viz., cereals, cereal offals, oil cake, meals, etc., never suffer from phosphate deficiency. Fowl and pigs are thus fed and in their case a simple mineral supplement consisting of a mixture of lime (calcium carbonate) and salt (sodium chloride) suffices.

SUMMARY.

The occurrence of phosphate deficiency in pasture land of Offaly and nine other counties of Ireland, causing either pronounced or incipient aphosphorosis, as already reported, is summarised. A case of aphosphorosis on what appeared to be reasonably good pasture in North County Dublin is reported. It is pointed out that aphosphorosis, as yet not diagnosed, occurs widely in other counties and that the losses suffered by stock owners because of inadequate intake of phosphate by grazing animals amount to an annual figure of big dimensions.

Attention is drawn to the necessity to provide a supplement of salt for animals grazing certain type of pasture.

Reference is made to a reported case of cobalt deficiency in the pasture herbage which caused serious losses on a farm in Sligo, where sheep declined and died. A perusal of the literature regarding cobalt deficiency in other countries and a comparison with conditions existing in this country point to the existence of cobalt deficiency on many of our pastures, and indicate that this may be a serious limiting factor to successful animal production in certain parts of the country.

Reference is further made to a case of copper deficiency in Offaly on cut-away bog pasture, where affected cattle scoured persistently. Because of the similarity of the moory and boggy pastures of this country, on which cattle grow very slowly, with certain grazing lands of other countries where deficiency of copper causes retardation of growth, frequently accompanied by scouring, it is considered that the poor economy of stock production on our moory pastures is at least partially due to insufficient intake of copper.

Varied aspects of mineral deficiency are discussed including methods of supplying the deficiency, viz., applying the minerals in question as a top-dressing to the pasture and providing them as a supplement to the diet in the form of a mineral mixture or as a drench. The composition of a suitable mineral mixture for general use in all cases of pasture deficiency is indicated.

The urgent need for a comprehensive investigation into mineral deficiencies in the pasture herbage of this country is emphasised.

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REPORT ON TREATMENT OF CATTLE IN LOOP HEAD PENINSULA

Complaints were received in the summer of 1948 by the Department from representatives of the farming community in the area, that mortality amongst cattle in the Loop Head Peninsula, County Clare, which had been steadily increasing for a number of years past, had now reached most serious proportions.

Immediate action was taken, and following investigations by a Veterinary Officer of the Department in the area it became apparent that this mortality was in the main due to ever-increasing infestation of cattle by three internal parasites, viz. :—(*a*) Strongyles of the stomach and intestines causing scouring and pining, (*b*) Hoose worms causing Husk or Hoose, and (*c*) Fluke worms of the liver causing pining and fiequently death.

It was, therefore, decided to carry out a large scale treatment of cattle in the peninsula for these conditions, the drugs used being Phenothiazine for Strongyles of the stomach and intestines, and Hexachlorethane for Fluke. No special treatment was adopted for Hoose other than Phenothiazine administration at 14-day intervals, housing and increased rations for calves.

Four Departmental Veterinary Officers, fully equipped with above drugs etc., commenced treatment of cattle in the peninsula on August 31st, 1948, and continued up to September 24th, 1948, inclusive, on which date all requests for such treatment had been attended to. 3,189 cattle, the property of 324 owners, were treated. The total number of cattle on these 324 holdings was 4,622, giving a percentage of 68.84 per cent. of cattle on these holdings treated.

To confirm the clinical diagnosis of Strongylosis, Hoose and Fluke, random individual faecal samples, numbering 78, were collected on a number of holdings in each district during the initial visits. Of these, 44 showed evidence of parasitic infestation. Considering that the egg-laying capacity of the parasites is much inhibited during the summer and early autumn and that many of the faecal samples came from clinically healthy cattle in good condition, the above findings would indicate a probable heavy infestation.

DESCRIPTION OF AREA.

The entire peninsula from Kilkee to Loop Head was included in the scheme. The land in general is marshy, badly drained and in many cases over-run with Ragwort. The hay crop is of poor quality, has a high Ragwort

content and is of low nutritive value. Lime is difficult to procure and therefore little used. Artificial manures, recently made available, are now being widely used and should effect a great improvement in the quality of the pastures. Farmyard manure is used chiefly on the crops, a small proportion being used as top-dressing for meadows. None is used on the pastures.

There are four auxiliary creameries in the Peninsula, branches of the Central Creamery at Kilrush and almost all stockowners are suppliers. Many owners in an effort to stem the heavy losses amongst calves housed the 1948 crop altogether and many of these calves when seen were stunted and unthrifty, and in several instances they were found to be affected with Hoose, Fluke and Stomach worms, probably as a result of feeding out grass to them. Much of their unthriftiness is also probably due to lack of essential vitamins and minerals and to bad housing conditions.

As was to be expected following a good grazing season most cattle seen were in good condition, though a number of piners were noted as well as a good deal of hoose and pining in calves. Inquiries by the four Veterinary Officers into the losses amongst cattle showed that these had been very considerable, the actual figures for September, 1947, to September, 1948, being a total of 964 deaths, of which 853 were attributable to internal parasites, *i.e.*, 88.48 per cent. Indirect loss through chronic "Pining" resulting from parasitic infestations was also very considerable. Other conditions of note in the peninsula included Red Water, Blackquarter and scouring in such calves probably dietetic in origin.

OUTLINE OF THE SCHEME.

At the initial visit to each holding the owner first signed an Indemnity Form in respect of all cattle treated. He then paid 1/- per animal treated towards cost of medicaments, etc. This covered all further treatments of such animals.

ORGANISATION PROGRAMME.

It was found most convenient to divide the peninsula up into 7 districts as follows :—1. Cross, 2. Kilbaha, 3. Doonaha, 4. Kilfeeragh, 5. Querrin, 6. Carrigaholt, 7. Moveen. One lecture was delivered in each of the above districts, the average attendance being 60. The main conditions dealt with were Strongyles of the stomach and intestine, Hoose and Fluke, under the headings (*a*) Life history and mode of spread of the parasites, (*b*) Symptoms, (*c*) Diagnosis, (*d*) Treatment, sub-divided into (1) curative and (2) the various aspects of prevention. The scheme of treatment was explained in

detail following each lecture, and the names of those wishing to participate were taken. Treatment in each district was commenced on the day following the lecture in that district.

PROCEDURE ADOPTED.

When each holding was visited the animals to be treated were first inspected to ascertain the dosage scale applicable. At the first visit all cattle treated received Phenothiazine. After an interval of about 14 days a second visit was made when cattle of one year old and over received Hexachlorethane except in such cases where, in the Veterinary Officer's opinion, a second treatment with Phenothiazine was desirable. Calves received a second treatment with Phenothiazine and the requisite dose of Hexachlorethane for every such calf was left with the respective owners for administration about mid-November.

During the course of the second visits to holdings a number of owners put extra cattle under treatment and a number of new owners requested treatment. In such cases the procedure adopted was to administer Phenothiazine to store cattle and calves and Hexachlorethane to cows. Further doses of Phenothiazine were left to be given to the calves in 14 days and of Hexachlorethane to be given to the store cattle after a similar period. In addition the requisite doses of Hexachlorethane for calves were left for administration in mid-November.

PRECAUTIONS ADOPTED.

In all instances where weak or undersized cattle were treated the applicable dose was divided into two equal parts and an interval of 24 to 48 hours was allowed between administration of the two doses. When milch cows were being treated with Hexachlorethane all were not dosed simultaneously as milk taint lasting for 24 to 48 hours follows dosing with this drug.

Animals more than 7 months pregnant and calves under 3 months old were not treated.

No untoward sequels followed dosing with the exception of one fatal case noted during the first post treatment survey in the last week in November, 1948. This fatality occurred in a 7 month calf, one of four treated by the owner on November 15th with Hexachlorethane left for that purpose. The above calf was ill on the following morning showing symptoms of colic, incoordination and partial blindness. He was unable to stand on the 17th and eventually became comatose and died on November 21st. All food was

refused. The other three calves were inspected on November 24th and were in perfect health. Hexachlorethane doses were also left to this owner for older cattle and it is possible that in error one of these larger doses was given to the calf in question. Of the 3,189 cattle treated this was the only fatality as a direct result of dosing.

The peninsula was again visited on November 22nd, 1948, and a lecture delivered at each of the following centres :--(1) Kilbaha, (2) Carrigaholt, (3) Doonaha, (4) Moveen. The average attendance was 40. Calf husbandry including feeding and housing was dealt with in detail and the desirability of introducing a mineral mixture to the diet of cattle, particularly of calves and pregnant cows, was emphasised. The necessity of immediate further treatment of all cattle of a year old and over with Hexachlorethane was also stressed. (Animals under that age had recently received the Hexachlorethane doses left for administration in mid-November). Owners who had not previously had their cattle dosed were advised to administer immediately a suitable Phenothiazine dose, followed by Hexachlorethane in about 14 days. From inquiries made and information volunteered at these lectures it was learned that up to date the results of the treatment were most satisfactory.

75 holdings were visited, taking in a representative group in each of the 7 districts mentioned under the Organization Programme. In every instance the treated cattle were healthy and there was no evidence of pining. A few calves had slight hoose coughs but were otherwise healthy.

A most striking result was a complete freedom from mortality on these 75 holdings with the one exception mentioned. In many instances where calves had been weak and coughing when first treated in September, complete recovery had ensued. On each of 3 farms visited there had been a 1½ year old in an emaciated and dying condition when treatment was carried out in September. These animals made a complete recovery and in fact two were sold at a recent fair. There were numerous other instances of pining animals which made a spectacular recovery.

One rather striking experience during the November, 1948, survey is worth recording :—

On one particular farm visited all the cattle had been treated. A group of these animals was inspected at pasture and with the exception of two, all were in remarkably fine condition. The owner's attention was drawn to the rather emaciated appearance of these two cattle and he stated that these animals were trespassing and were the property of a neighbour who had not had his cattle treated.

Another owner visited in November lost 24 out of 25 of his 1947 calves and 20 out of 24 of his 1946 calves. These losses began in September each year. All his 15 calves were treated in September, 1948. Some were emaciated, weak and coughing at that time. They were in good condition and appeared healthy at the November inspection. A further evidence of the success of the treatment was that owners in the peninsula who had not availed of the treatment at first were using the drugs in November. During the November survey arrangements were made with local merchants that supplies of mineral mixture be made available in the peninsula.

A further survey in the Loop Head Peninsula was carried out beginning on February 8th, 1949, and extending up to February 16th. During this period each one of the 324 holdings on which cattle had been treated was visited and the cattle were inspected. Once again the results were most striking and every one of the stockowners was highly gratified.

The appalling total of 964 deaths amongst cattle on these holdings from September, 1947, to September, 1948, had now been reduced to 19 and of these only 7 could be attributed to parasite infestation. Again of this 7 one calf was dying of hoose pneumonia at the time of treatment and was quite a hopeless case.

A fairer comparison therefore would be :—

Deaths attributable to Parasite Infestation in	1947/48	853
,, ,, ,, ,, ,, ,,	1948/Feb., 1949 ..	6

Admittedly losses amongst cattle in the peninsula have been small this year but as previously stated the few owners who did not participate in the scheme have since obtained and used the drugs themselves and for this reason also it was impossible to obtain a worth-while comparison between treated and untreated cattle. One instance can, however, be quoted where an owner presented for treatment one 3 year old bullock out of a total of 19 cattle. This animal was emaciated and faecal examination showed fluke infestation. He received the full course of treatment and it was learned during the February, 1949, survey that he had improved remarkably and had recently been sold in good condition whereas eleven other 3 year old cattle which had been left untreated remained poor and unthrifty. Owners are unanimous in the opinion that their cattle are healthier and in better condition this year than for many years past. Furthermore they state that unlike other years they now find that increased feeding produces a proportionate increase in the general condition of the animals.

The 1948 crop of calves was high spirited and gambolled about each morning when released, whereas at this period in the spring of former years the few which had survived were emaciated, dull and listless.

Treated cows gave more milk and had longer lactations.

Many treated cattle have been sold recently in good condition and cattle dealers show a decided preference for cattle which they learn have been treated.

Many owners state for the first time in several years they will have marketable cattle for sale this year. Numerous instances were encountered of what owners refer to as "miraculous" recoveries in bad clinical cases of parasitism. Another striking testimony of the value of the treatment was forthcoming following a lecture delivered to Kilkee Young Farmers' Club on February 7th, 1949. A local butcher and fellmonger stated that on referring to his records he found that by February in former years he had approximately 300 hides from the Loop Head Peninsula; from September, 1948, to February, 1949, he had collected only 3 hides from the peninsula.

During the February, 1949, survey two owners living in close proximity stated that in the early spring of 1948 they buried between them 18 yearlings within a fortnight. Neither owner has lost an animal since treatment in September, 1948. It was found that as a result of advice given at the various lectures many owners have been feeding a mineral protein mixture to calves and pregnant cows with uniformly good results. One such owner had been feeding this mixture to an in-calf cow aged 8 years. She had been a poor milker at previous lactations. She calved down recently and is giving 4½ gallons of milk and has to be milked three times daily.

Not alone has the scheme of treatment been a complete success from the point of view of reducing mortality and chronic pining to negligible proportions but it has also had a very great educational value. All owners are now fully conversant with the drugs and the correct time for using them each year for prevention of parasitism. In fact, through the medium of these drugs and the educational value of the various lectures their outlook has been swiftly changed from one of despair to a well founded optimism. It is obvious that a new interest has been awakened in them as evidenced by their keenness to obtain artificial manures for their land and to improve the feeding and housing of their livestock.

STOCK POISONING BY RAGWORT

The ragwort plant (Senecio jacoboea L., Senecio aquaticus L. and other species) is a common weed of the farm and waste grounds, easily recognised by its conspicuous appearance, and known by various local names as ragweed, ben weed, bookalawn, etc. It is widely distributed throughout the world consisting of many species all of which show a general resemblance to each other. The common ragwort is regarded as a biennial and the first year's growth takes on a rosette appearance with the deeply cut leaves lying close to the ground. The two year old plant is characterised by a long stem 2 to 3 feet in height which bears clusters of yellow blossoms during the late summer months. It produces myriads of fluffy seeds which are easily distributed by wind and other agencies, hence the profusion with which it is seen in many districts.

SPECIES OF IMPORTANCE IN IRELAND AND HABITATS.

There are nine species of the ragwort plant occurring in Ireland. Of these and their varieties the farmer is chiefly concerned with two, (1) the common ragwort (Senecio jacoboea L.) and (2) the marsh ragwort (Senecio aquaticus L.), which as its name implies grows in marshy land, along drains, ditches and watercourses. Since these normally occur in pastures and in meadows they are therefore the species most commonly incriminated in ragwort poisoning of animals. A third common species, but less common than the previous two, is the Senecio Sylvaticus L., which grows on waste ground and which may be eaten in time of drought or during early spring when grass is short.

RAGWORT POISONING IN VARIOUS COUNTRIES.

Although several species of ragwort have been proved to be poisonous to stock in South Africa, Canada, New Zealand, Norway, U.S.A., Great Britain and Ireland, the majority of stockowners in Ireland are still inclined to regard it as a harmless weed which is generally not eaten by farm animals except sheep. This erroneous opinion has arisen because ragwort is a very common weed on most farms, and sheep are frequently used in the early part of the year to clean pastures containing the young plants with no apparent ill effects. This view has also been supported by the observation, that unlike what occurs in hemlock, yew tree and many other kinds of plant poisoning, symptoms of ragwort poisoning do not develop immediately or shortly after eating the plant but only after a delay of weeks or months.

This latent period renders it difficult for the stockowner to associate the illness with the consumption of the plant. No doubt these observations are responsible for the sceptical attitude adopted by many owners regarding the poisonous properties of ragwort.

SUSCEPTIBILITY OF DIFFERENT SPECIES OF FARM STOCK.

Cattle, horses and sheep vary in their susceptibility to the poisonous effects of ragwort, sheep showing a marked tolerance or resistance compared with horses and cattle. The resistance shown by sheep is not absolute, and can be overcome when sheep are pastured over a long period on land very heavily infested with ragwort, or in periods of drought such as occurs in New Zealand. Ragwort poisoning has not been recorded in sheep in Ireland on account of its equitable climate and the low density of the sheep population in lowland farms.

TOXIC (POISONOUS) PROPERTIES.

The poisonous properties of ragwort are due to alkaloids which are present during all stages of growth of the plant. There is, however, experimental evidence that the plant is more poisonous during the pre-flowering stage. The alkaloids resist sun drying and therefore ragwort found in well saved hay is more poisonous weight for weight than the green plant. The seeds of the plant are also poisonous and have been incriminated in bread poisoning in the human subject, in the native settlements of South Africa through the use of contaminated cereals subjected to primitive milling processes.

CUMULATIVE ACTION OF RAGWORT POISON.

Ragwort poisoning in cattle and horses is a slow process under natural conditions and generally follows continuous feeding on contaminated hay or grazing for fairly long periods on heavily infested pastures resulting in a gradual intake of the plant in small quantities over a period of weeks or months. When sufficient of the plant has been consumed symptoms will develop after intervals varying from weeks or months depending on the individual susceptibility of the animal.

CONDITIONS WHICH FAVOUR THE OCCURRENCE OF RAGWORT POISONING.

Horses and cattle are very selective in their grazing and feeding habits, and do not voluntarily eat ragwort at pasture or when housed if other feeding stuffs are available in sufficient amounts to satisfy their needs.

It is well established that the disease is more prevalent following dry summers due to shortage of grazing occasioned by the low rainfall. It is therefore only during periods of great scarcity of grass as in conditions of drought or overstocking that the weed is unavoidably eaten in small quantities in a search for suitable herbage. Under these circumstances the grazing of dykes, ditches, sides of drains and streams where the marsh ragwort (Senecio aquaticus L.) flourishes is frequently observed. The young plants of both this species and the common ragwort (Senecio jacoboea L.) are probably the chief causes of poisoning in cattle and horses at pasture.

In housed animals poisoning may arise from the feeding of heavily contaminated hay and particularly if fed in insufficient quantities. The quantity of hay fed is important, because horses and cattle being very selective in their feeding habits will reject the ragwort if sufficient hay or other fodder is available to satisfy their wants.

The following are the conditions which favour the occurrence of ragwort poisoning and which should be avoided or minimised as far as practicable.

(1) Over stocking of poor and badly seeded pastures containing ragwort.
(2) Feeding weedy or poor quality hay containing ragwort during winter and early spring.
(3) Mowing weedy pastures for the control of ragwort and other weeds and saving the hay for winter feeding.
(4) Leaving cut or pulled ragwort to remain on pastures where young cattle are pastured.
(5) Confining stock for long periods to grazing land heavily contaminated with ragwort.
(6) Feeding chopped hay containing ragwort to horses.

SYMPTOMS.

CATTLE.—In cattle the symptoms are largely of the nervous type characterised by blindness, normal temperature, decreased skin sensitivity, staggering gait, sometimes diarrhoea and pronounced intermittent attacks of straining which is the most characteristic symptom. Some animals become aggressive when approached. The duration of the disease varies in different animals, but death generally occurs within 1 to 3 weeks after the onset of the symptom. The disease runs a much shorter course in cattle than in horses.

HORSES.—It is of interest to note that the disease in horses first attracted attention in England in 1787 following a hot dry summer, and again was very prevalent in the south-west of England and Wales following the dry summers of 1800 and 1819, being most common in horses at grass in low, wet pastures. Even at that very early date it was attributed by stockowners

to the eating of ragwort or staggerwort, the latter name, no doubt, arising from the characteristic staggering gait shown by affected horses. The symptoms, predominantly nervous in nature, consist of gradual loss of condition, impaired appetite, yawning, dullness, sleepy attitude in the stall or stable, inco-ordination of gait, pressing head against wall of the stable, depraved appetite, absence or decrease in skin sensitivity, partial or complete blindness and walking into objects. These symptoms may continue for a long period extending into weeks and months, with periods of apparent recovery, only to be followed by relapses with steady gradual deterioration in the condition of the animal, finally resulting in death. The disease as a rule runs a chronic course in the horse extending over a number of months but exceptional cases occur where death occurs within 3 or 4 weeks.

DIAGNOSIS.

The disease can be readily diagnosed by an experienced Veterinary Surgeon in the living animal, and, if necessary, confirmed by a post-mortem examination for the detection of the characteristic lesion of liver cirrhosis.

TREATMENT AND ADVICE WHEN RAGWORT POISONING OCCURS ON FARM.

There is no curative or preventive treatment for ragwort poisoning. Once the disease is definitely diagnosed on a farm, if hay is being fed it should be examined for ragwort, and, if necessary, changed to that of good quality, if the disease occurs at pasture, the animals should be moved to good pasture. If through necessity heavily infested pasture has to be grazed the grazing of such land should be frequently interrupted by changes to less weedy pastures and over stocking should be avoided. If sheep are available, mixed grazing with sheep and cattle of the weedy pastures should be practised, the cattle being subsequently moved at frequent intervals to good pasture.

CONTROL AND ERADICATION OF RAGWORT.

The only safe measures stockowners can take to prevent ragwort poisoning in stock is by adopting measures to control and eradicate the weed. This can be done by repeated cutting or preferably pulling of the plants early in July when the plant is coming into flower, collecting the cut plants and burning them, because some plants may have seed heads already formed which may ripen and shed their seeds. The cutting or pulling should be repeated again in about six weeks. This operation should be repeated again the following year and it is always advisable to continue it for a third year. The first year's cutting or pulling only eliminates the two year old

plants with the long stems, the year old and younger plants escaping detection or cutting on account of their closeness to the ground. In addition to the adoption of these measures sheep may be used during the spring and early summer for eating down the young plants and cleaning the pastures.

On account of the recurring annual losses which occur in many counties of Ireland and the ease with which the plant can spread throughout vast stretches of the countryside, a joint effort should be made by neighbouring farmers in such areas or counties to carry out the instructions in this leaflet.

Finally it should always be remembered that ragwort is listed under the Noxious Weeds Act, 1936, and that occupiers of land failing to destroy it are liable to prosecution.

WATER DROPWORT (OENANTHE CROCATA) POISONING IN CATTLE

By

P. Crowley, M.R.C.V.S., District Veterinary Officer, Department of Agriculture, Cork.

Water Dropwort is a weed which grows in marshy places, ditches and other wet spots. It, as well as the parsnip, parsley and carrot, belongs to the family Umbelliferae. Species of this family are recognised by their flowering branches. The leaves are finely divided as in the carrot. The plant is a perennial and usually has several stout irregular or roughly spindle shaped roots which carry longitudinal grooves. A new crop of leaves arises from the root crown each season and stout branched stems grow from the root. The stems which are hollow and grooved on the surface reach a height of about four feet and come into flower in June and July. Later the stalk and leaves wither so that detection of the weed in the soil becomes difficult until the next crop of leaves appears. The weed is known to be highly toxic for animals, all parts being poisonous and mortality has also occurred in children who had mistaken the root for parsnip. *The toxic dose of the fresh root for animals has been estimated as 1¼ lb. per 1,000 lb. body weight. The usual case history, where poisoning by the weed has been confirmed, is that ditches had been recently cleaned and that the animals had access to the roots which had been thrown on to the pasture during the cleansing.

In two cases recently met with by me the case history was somewhat unusual, in that ditches had not been recently cleaned and the weed was not found growing inside the boundaries of the pasture. It transpired that the pasture, in each case, had been flooded during the exceptionally heavy rains which occurred during December, 1948. The mortality occurred in farms about fifty miles apart.

The details of the cases are:—

Case No. 1.—The pasture was extensively inundated. When the floods had subsided, 16 cattle aged from 2–3 years were allowed on the pasture. Five days later the owner found one 2-year-old heifer dead. Next day a second heifer was found dead. On the third morning, a workman was sent to collect the remaining cattle and while they were being driven, a third animal, a 3-year-old bullock, was taken ill. The symptoms as observed by the workman were :—the animal suddenly stood still and began to shiver

*Cornevin in "Plants Poisonous to Live Stock" by Harold C. Long.

and this was most marked about the loins and hind quarters. The eyes were staring. The head was raised high in the air and the neck was bent backwards. The animal then began to turn rapidly in circles, fell down and kicked with all four legs and showed convulsive movements of the head and neck. At this stage the workman hurried on with the other cattle and informed the owner. He was, therefore, unable to say what interval elapsed until death occurred, but when the owner reached the spot about twenty minutes later the animal was dead. The ingesta was examined and portions of a parsnip-like root were present. The ditches and river bank inside the boundary of the farm were searched for the growing plant but without result. The pasture was then examined and a plant with similar roots was found lying uprooted at a point where the animals had access to the river.

CASE NO. 2.—In this case the animals, being on an out farm, were not under close supervision and all three were found dead—one on one morning, and two about a fortnight later. The roots were present in the ingesta and similar roots were found lying on the pasture. There was evidence of recent flooding. The river on the proximal side of the pasture was examined and an abundant growth of plant with similar roots was evident and uprooted plants were seen lying on the river bed. The owner had noted that the pasture had also been flooded prior to the death of the first animal.

Specimens of the roots from the ingesta and pastures were forwarded to the Veterinary Research Laboratory and were identified as Oenanthe Crocata.

The cases may be of interest, in that the roots were uprooted and borne by the floods to the pasture from outside the farms and this possibility should be borne in mind where there is a sudden, non-bacterial mortality in animals following on flooding, when there is no evidence of growth of toxic weeds on the farm.

ACKNOWLEDGMENTS.

I am indebted to Mr. Timoney, Director of Research, Thorndale, for the identification of the roots and on whose suggestion the cases have been reported, and to Messrs. D. O'Keeffe, John Mahony and Capt. M. O'Sullivan, M.C., Veterinary Surgeons, for their co-operation.

EXPERIMENTS ON THE MANURIAL VALUE OF CREAMERY SEWAGE

By

J. J. RYAN, M.Sc., A.R.C.Sc.I., Dairy Chemistry Department, University College, Cork.

The Drinagh Co-operative Society, Dunmanway, Co. Cork, decided about four years ago to adopt broad irrigation as a means of disposing of their creamery sewage. This decision was made possible by the fact that the Society were in possession of an area of land convenient to the creamery.

The creamery is at a higher level than the land, with the exception of about 10 acres, so that it is possible to distribute the effluent by gravitation. The effluent is piped under the road and then carried in open concrete channels to the higher parts of the land and distributed from there by means of small channels. A workman diverts the flow into the different channels from time to time according to his judgment of the irrigation needs of the various areas. The man's time on this work averages about one half hour daily.

Owing to the uneven contour of the land, uniform distribution was not possible; consequently, some parts were much more heavily irrigated than others. The system, nevertheless has, up to date, proved to be a cheap and satisfactory one for disposing of the creamery sewage. There is no evidence, after the three years the system has been in use, of "sewage sickness," and cattle showed no disinclination to graze even the more heavily irrigated parts.

Apart from the satisfactory disposal of the effluent, the Society was interested in its fertilizing value and its general effect on cropping conditions. With a view to gaining information on these matters the co-operation of the Dairy Science Faculty, University College, Cork, was requested.

The purpose of this report is to give an account of some experiments carried out in order to determine the effect of irrigation with creamery effluent on the growth of grass for pasture and hay.

The area of the farm is roughly 50 acres. Approximately 37 acres are irrigable but, owing to the uneven contour, the entire area cannot be uniformly treated with effluent.

The herbage growing on the pasture lands before irrigation was very poor and small in bulk and consisted of bent grass, Yorkshire fog, a small amount of white clover and a considerable proportion of weeds. In 1945, before treatment with effluent, the pH values of all the fields were determined. They ranged from 5.4 to 6.3. These values, though hardly classifying the soil in general as acid, suggested, especially in view of the leaching effect of creamery effluent and its tendency to promote acidic conditions, the need for periodic dressings of lime. Available phosphate as estimated by the method of Peech and English (1) gave percentages ranging from 0.001 to 0.003 expressed as P_2O_5, values which indicated, taking into account the unbalanced nature of creamery effluent as a fertilizier, the advisability of phosphatic manuring.

The daily volume and concentration of the effluent were not determined experimentally. An estimate by the Manager of the Creamery put the daily peak volume of the effluent at about 10,000 gallons and the quantity of milk which it contained at about 60 gallons. The average yearly milk supply of an Irish creamery is roughly the peak daily supply multiplied by 170. Assuming the milk loss in the effluent to be proportional to the milk supply throughout, this would correspond to an annual loss of roughly 100,000 lb. in the case of Drinagh.

The potential manurial ingredients in this quantity of milk, according to its average composition as given by Davies (2), would amount approximately to :—

CaO—170 lb.	equivalent	roughly	to	1½	cwts. burnt lime.
P_2O_5—220 lb.	,,	,,	,,	12	cwts. 35% Superphosphate.
K_2O—179 lb.	,,	,,	,,	8	cwts. 50% Muriate of Potash.
N.—536 lb.	,,	,,	,,	24	cwts. 20% Sulphate of Ammonia.

The original scheme of irrigation was to treat 10 acres in one-acre divisions by irrigating each division for 3 days and then giving it 27 days' rest. This system was found, however, to be impracticable owing to interference with the grazing and meadowing of the land. The method finally adopted was to irrigate larger areas for longer periods at times which would not interfere with the use of the land. The irrigation was, therefore, carried out from 2 to 5 times annually according to the purpose for which the land was used,

the length of the irrigation periods being regulated according to the absorbtive capacity of the soil. To suit this scheme, the area under irrigation was extended to 20 acres.

Irrigation commenced in late summer 1945. About two months later the land was inspected and it was observed that the irrigated portions had a much heavier cover of grass than the unirrigated. This was particularly the case in a field which had been ploughed and re-seeded in the spring of that year. This field had been given a dressing of 3 cwts. of superphosphate and 1 cwt. of muriate of potash and was divided into 2 parts, one of which was irrigated and the other not. The irrigated part was covered with a dense growth of rye grasses and red clover while the growth on the unirrigated portion was comparatively poor.

In view of the apparently good results obtained from the field mentioned, several other fields were ploughed and reseeded in 1946 and 1947 and then brought under irrigation. It was observed in all cases that irrigation improved the growth of grass.

In order to assess quantitatively the fertilizing value of creamery effluent for the growth of grass and hay, it was decided in 1947 to compare the yields obtained from irrigated with those from unirrigated plots in the same fields. For this experiment 3 fields which will be referred to as A, B and C were selected. The manurial treatment of these fields, apart from irrigation, and the crops grown on them for the years 1945 to 1947 are given in Table I.

TABLE I.

Manurial Treatment and Cropping of Irrigated Fields.

	1945		1946		1947	
Field	Fertilising Treatment per Acre	Crop	Fertilising Treatment per Acre	Crop	Fertilising Treatment per Acre	Crop
A.	None	Old Pasture, almost barren	1 ton Lime 3 cwt. Super	Re-Seeded Grass	15 cwt. Lime 3 cwt. Super	Grass for Silage
B.	None	Old Pasture, almost barren	1 ton Lime 3 cwt. Super	Oats and Barley	15 cwt. Lime 3 cwt. Super	First Crop Hay
C.	8 Tons Sea Sand	Wheat, poor crop	3 cwt. Super	Re-seeded Grass	15 cwt. Lime 3 cwt. Super	Grass for grazing

Plots, each 1/100 of an acre, were marked out at random on both irrigated and non-irrigated areas. The yield of grass from each plot was weighed and representative samples were analysed. Portions of fields A and C were irrigated in 1946 and 1947 while B was irrigated only in 1947.

In fields A and B in which hollows occurred, the areas of dispersion of the sewage were largely confined to the hollows which accordingly got heavy doses of the sewage. The soil in these hollows, however, was able to absorb the sewage rapidly enough to prevent pool formation on the surface of the ground. Plots situated in such hollows are designated in the following Tables as "heavily irrigated," while plots situated on more level ground which were irrigated more lightly and evenly are designated "moderately irrigated." In the heavily irrigated portions, the grasses were stemmy and grew very high. The hay, nevertheless, was of fair quality and was relished by cattle.

Table II. gives the percentages dry matter and the composition of the grass (dry-matter basis) for the various plots—1947.

TABLE II.

	Irrigation Treatment	Dry Matter %	Composition of Grass (Dry-matter basis) Crude Protein %	Crude Fibre %	Ether Extract %	N-Free Extract %	Ash %
Field A cut at Hay Stage	"Heavily Irrigated"	21.6	8.7	33.3	1.3	49.5	7.2
	"Moderately Irrigated."	24.9	7.7	31.9	1.2	53.9	5.3
	Not Irrigated	26.6	7.8	28.7	1.6	56.7	5.2
Field B cut at Hay Stage	"Heavily Irrigated"	19.1	9.1	37.7	0.8	46.1	6.3
	"Moderately Irrigated."	22.8	9.7	34.6	1.0	48.3	6.4
	Not Irrigated	32.6	6.8	34.3	1.2	53.1	4.6
Field B cut at After-math Stage	"Heavily Irrigated"	30.0	9.9	28.3	1.4	54.8	5.6
	"Moderately Irrigated."	34.1	10.0	27.5	1.1	55.5	5.9
	Not Irrigated	33.6	7.5	26.6	0.8	59.7	5.4
Field C cut at 2nd grazing	"Moderately Irrigated."	17.5	21.0	26.1	1.3	41.8	9.8
	Not Irrigated	25.9	15.6	25.6	1.2	49.5	8.1

Table III. gives the yields of grass, dry matter and crude protein per acre. The figures in parentheses give the comparisons based on 100 for the non-irrigated land. Table III (*a*) gives the yield index averages for the 3 fields.

TABLE III.

	Irrigation Treatment	Grass Tons per Acre	Dry Matter Cwts. per Acre	Crude Protein Cwts. per Acre
Field A cut at Hay Stage	"Heavily Irrigated" ..	16.9 (422)	73 (344)	6.4 (380)
	"Moderately Irrigated"	12.2 (305)	60.8 (287)	4.7 (280)
	Not Irrigated	4.0 (100)	21.2 (100)	1.7 (100)
Field B cut at Hay Stage	"Heavily Irrigated" ..	16.8 (350)	64.2 (206)	5.8 (276)
	"Moderately Irrigated"	11.9 (248)	54.2 (173)	5.3 (252)
	Not Irrigated	4.8 (100)	31.2 (100)	2.1 (100)
Field B cut at Aftermath Stage	"Heavily Irrigated" ..	4.9 (980)	29.4 (865)	2.9 (966)
	"Moderately Irrigated"	2.5 (500)	17.0 (500)	1.7 (566)
	Not Irrigated	0.5 (100)	3.4 (100)	0.3 (100)
Field C cut at 2nd Grazing	"Moderately Irrigated"	9.3 (517)	32.6 (350)	6.8 (486)
	Not Irrigated	1.8 (100)	9.3 (100)	1.4 (100)

TABLE III. (*a*).

Yield Index Averages.

Irrigation Treatment	Grass	Dry Matter	Crude Protein
"Heavily Irrigated"	415	299	370
"Moderately Irrigated" ..	323	253	336
Not Irrigated	100	100	100

On a visit to the farm at the end of June, 1948, it was apparent that the beneficial effects of irrigation with creamery effluent were being maintained. The growth of grass in the pasture fields appeared to be considerably better in the portions which had been irrigated than in those which had not. Some of the fields which had been irrigated in 1947 were under cereal crops and here too the good results of irrigation were obvious.

För the purpose of assessing quantitatively the results of continued irrigation, cuttings were again taken from one of the fields—C. The whole of this field had received a dressing of 8 cwts. superphosphate per acre in the winter. The same portion as in previous years was periodically irrigated. The non-irrigated portion was sub-divided, one part receiving a dressing of nitrate of ammonia at the rate of 1 cwt. per acre, the other remaining untreated.

There was good growth of grass in this field, especially in the irrigated portion, by the end of March. It was shut off early in May, after the second grazing, to provide grass for silage. Experimental plots were cut on June 28th.

Table IV. gives the yields of grass, dry matter and crude protein per acre, as well as the percentage protein (dry matter basis) for the various plots. The figures in parentheses give the comparisons based on 100 for the non-treated land.

TABLE IV.
Field C—1948.

Treatment	Percentage Dry Matter	Percentage Protein (Dry Matter basis)	Grass Tons per Acre	Dry Matter Cwts. per Acre	Crude Protein Cwts. per Acre
"Moderately Irrigated"	18.75	17.40	12.05 (317)	45.2 (233)	7.86 (374)
1 cwt. Nitrate of Ammonia per acre, not irrigated.	25.90	13.10	4.40 (116)	22.8 (118)	2.99 (142)
Neither Irrigated nor treated with Nitrate of Ammonia.	25.50	10.90	3.80 (100)	19.4 (100)	2.10 (100)

DISCUSSION.

The experiment shows in all cases considerably higher yields of dry matter and crude protein in plots which were irrigated by creamery effluent than in those which were not. It will be seen from Table III. that the dry matter and crude protein per acre increased with the rate of application of creamery effluent. In hollows of fields A and B where the land was "heavily irrigated" the yield of dry matter in cwts. per acre ranged from 29.4 to 73 as against a range of from 3.4 to 31.2 for the unirrigated portions. The difference in protein yields between "heavily irrigated" and non-irrigated land was still more striking.

From Tables III. and IV. it will be seen that portions "moderately irrigated" yielded considerably more dry matter and crude protein than where no effluent was given. Table III. (*a*) shows that, on an average, grassland

"moderately irrigated" yielded $2\frac{1}{2}$ times as much dry matter and over 3 times as much protein as grassland not irrigated. From Table IV. it will be seen that the irrigated land produced crops much heavier and better than those from land to which Ammonium Nitrate had been applied.

Examination of the chemical composition of the grass as given in Table II. shows that, in general, the protein content of the grass (dry matter basis) was higher for the irrigated portions, the only exception being Field A where there was scarcely any difference in protein content. This may have been due to the fact that no sewage was diverted on to this field for about 12 weeks before cutting. In 1947, Fields B and C, and again Field C in 1948, which shows much higher percentages of protein in the treated than in the untreated portions, were irrigated about 4 weeks before cutting. This is more or less in agreement with the work of Lewis (3) who found that the protein content of hay was markedly increased by applying nitrogenous fertilizers 10 to 20 days before mowing.

As seen from Table II. another feature is the increase brought about in the ash content by irrigation.

The results, in general, prove the value of creamery effluent in so far as the growth of grass and hay is concerned. It is not possible to deduce from the experiments the extent to which the increase in yields is due to the manurial ingredients of the effluent, as distinct from its watering effects, but that both effects were present seems to be indicated by the 1948 experiment in Field C, which shows that greatly increased yields were obtained from the irrigated portion compared with that which had received a dressing of Nitrate of Ammonia.

ACKNOWLEDGMENTS.

I wish to acknowledge my indebtedness to Professors Lyons and McGrath of the Dairy Science Institute for the help given in these experiments, and also to Mr. Michael McNamara, General Manager of Drinagh Co-operative Creamery, for his continued interest in the work and for placing facilities and data at my disposal.

SUMMARY.

Experiments carried out on irrigating pastures and meadow land, over a period of 3 years, with creamery sewage show this treatment to have considerably improved both the quality and quantity of the crop.

References.

(1). Peech and English : *Soil Science*, Vol. 57 ; 167. March, 1944.

(2). Davies, W. L. : *The Chemistry of Milk*. Chapman & Hall, London, 1936.

(3). Lewis : *Empire Jour. Exp. Agric.*, Vol. 9 ; 43. January, 1941.

A FORGOTTEN PIONEER

PATRICK GANLY, GEOLOGIST, SURVEYOR AND CIVIL ENGINEER

(1809-1899)

By

R. C. Simington, D.Litt., and A. Farrington, D.Sc.

The recent discovery of the "Geological Letters" (1837-44) of Mr. Patrick Ganly, who was the first to use the method of current-bedding to determine the inclination of strata,[1] and their related importance to the construction of Griffith's revised "Geological Map of Ireland" are reasons which combine to render it an agreeable duty to place on record some particulars of Ganly's career. That career, it may be said at once, began, matured, and culminated under Griffith's tutelage, and to this distinguished patronship Ganly would appear to have been indebted for most of his appointments. Of his youth and preparatory education, research has yielded nothing; of his early manhood and middle life an all too brief account is forthcoming from a series of old letter books transferred in recent years to the Public Record Office from the Valuation Office. In communicating what is known of Ganly, from this source, circumstances related by Griffith himself bearing on the construction of his own map must necessarily be recalled; these indeed, constitute the main content of this note. In a separate article (p. 46) features of the "Geological Letters," at present deposited in the Royal Irish Academy, are discussed by Dr. A. Farrington.

. . . .

The third and fourth decades of the nineteenth century presented to young men of education and ambition, attractive and, to all appearances, promising openings for successful careers in the State service in Ireland. In 1825-6, the Government introduced revolutionary measures for the reconstruction of the basis of local fiscal administration[2]; these involved the creation of three new departments of State—the Boundary Survey, Ordnance Survey, and Valuation Department, charged with respectively (1) the determination of the boundaries of the civil units of the country from the largest to the smallest denomination, (2) their scientific mapping and delineation on a scale of six inches to the mile, and finally (3) all that was comprehended in a general valuation of the country—its lands, buildings, houses, mills and so forth.

For the execution and administration of these enlightened undertakings, men of the widest and most diversified attainments and experience were assembled, some of whom by virtue of their genius and original contributions

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[1] *Journal* of the Geological Soc. of Dublin, Vol. 7, p. 164.

[2] Boundary Survey Act, 6 Geo. IV c.99 (1825); General Valuation Act, 7 Geo. IV, c.62 (1826).

have won a permanent place in the history of this outstanding period of constructive action in Ireland. But such mighty projects, involving in every sphere the exercise of the highest skill, exactness and endurance could not have been brought to fruition without the aid of a great number of highly competent and zealous workers. If many of these are forgotten, or have not received the honour that is their due, the apparent want of appreciation is to be attributed to the tradition which, when merit is to be acclaimed, recognises only departmental responsibility and efficiency.

Of two of the departments then established—the Boundary Survey and the General Valuation—Griffith became chief, and it was at his hands, Ganly, when a stripling of eighteen, received his appointment, first to the former office in 1827, and then to the latter, in 1830.[3] The requirements of both departments involved long periods of absence in the country, consultations with local authorities and landed proprietors in the process of the definition of boundaries, the preparation of parish maps, and the accumulation of a variety of information preparatory to the determination of valuation. It was not alone, however, in the capacity of surveyor or valuator that Ganly would appear to have attracted Griffith's particular attention, but as a geologist, and of his subordinate's talents in this connection Griffith fully availed himself during the second period of his Map, that is between 1835, the year of the presentation of the unpublished Map to the British Association, and 1855 when the revised Map of 1839 was published.

It is useful to note that kindred achievements in this period were the issue by the Ordnance Survey of the six-inch sheets and the County Index Maps 1834-44 ; the solitary but none the less distinguished Parish Memoir of Templemore—the outcome of Larcom's brilliant idea for the utilisation of the services of the Ordnance Survey in the interests of local history, 1837 ; Portlock's famous "Report" on the geology of Londonderry, 1848 ; the creation of the Museum of Irish Industry, 1845, and the establishment in the same year of the official Geological Survey of Ireland.[4]

By virtue of his positions as Director of the Boundary Survey and Commissioner of the General Valuation of Ireland, Griffith, it may be said, was exceptionally well-placed in respect of whatever investigations he desired to have made (apart from his own wide observations) for the purpose of his Geological Map begun in 1811 or 1812.[5] The boundaries of counties, baronies, parishes and townlands had first to be determined before they could be marked on paper by the Ordnance Survey, and this was Griffith's responsibility under the Act 6 Geo. IV. cap. 99 (1825). In this connection

[3] Valuation Office letter book, 1851 (P.R.O. 2A-26-79).

[4] Geological mapping in Ireland was undertaken by the State for the first time in 1832 ; see *Irish Trade Journal*, August, 1928, for a valuable review of the functions and work of the Geological Survey.

[5] *Cf* evidence given by Griffith in *Rep. of Select Committee* of Enquiry into Valuation, 1869. Geological maps of his of certain mineral areas bear the date 1814 ; *cf* article in *Trade Journal* cited.

and that of the General Valuation, begun in 1830, surveyors and valuators, as they were called, had to be recruited and trained, and provided with printed instructions containing special reference to the nature and classifications of soils. Any latent ability for geological observation would inevitably manifest itself in the course of a valuator's duties.

The assistance which Griffith received, *inter alios*, from his staff in making his Geological Map of Ireland was acknowledged on more than one occasion, either in the course of public addresses or official correspondence.[6] With, perhaps, nearly two hundred officials working under his direction, it would not always have been easy to refer by name to those to whom he was indebted, but there were occasions when this was done. By such acknowledgments Griffith left on record aspects of the history of the growth and development of his Map, a source which has provided material for this brief note. It would appear, however, that it was not until 1869, nine years after Ganly had retired from the Public Service, that Griffith acknowledged his individual contribution: the occasion was that of the Enquiry conducted by a Select Committee into the General Valuation.[7] Before quoting this acknowledgment and others of a departmental nature, it is desirable to refer more precisely to Ganly's employments.

Subsequent to his engagements in 1827 and 1830, he was transferred to the Ordnance Survey Office where he was employed in calculating "the position of the primary and secondary Trigonometrical points with reference to the fixed meridian of the county Derry."[8] Each series of six-inch maps, for any one county, was then plotted independently of those of other counties on a meridian chosen for that county. In 1833 Ganly was retransferred to Griffith. Between this year and 1847 his services were availed of in various connections: as draftsman preparing fair valuation maps of the counties of Antrim and Down; as surveyor on the revision survey connected with the Boundary department, and as geologist. What connections or communications of a geological nature Ganly may have had with Griffith prior to 1837 are not at present known, but early in that year he wrote to Griffith relative to the district of west Cork, north of Bantry, where he had marked the red slate and the black slate as both "dipping to the south." In the course of a lengthy reply addressed to Ganly at Westport, County Mayo, Griffith discussed his own recent geological examinations and observations in various districts, concluding thus:

> I grudge much your being employed on the Boundary Survey. I will remove you as soon as possible. I send you the map of Galway should you have time to examine a part of the county south of the Killeeres. You may do also the district north of Westport and Newport but do

[6] See, for example, *Presidential Address* to the Geological Soc. of Dublin in February, 1836.
[7] Rep. *Select Committee* on Valuation, *supra*.
luation Office letter book (P.R.O. 2A-26-79).

not go further. I shall be glad to hear from you once a week on geological subjects. I have received both your letters from Mayo which are very interesting to me.

This letter[9] is dated April 8th, 1837.

Thus was inaugurated the series of Geological Letters on the basis of which, as stated by Dr. Farrington, much of the revision of the final editions of Griffith's Map was based.[10] The Letters, of which there are three volumes, are stoutly bound in green leather. They are written on notepaper of fairly uniform size ($4\frac{1}{2}''$ x $7\frac{1}{4}''$) in a small, easily-legible hand, and are frequently illustrated by sketches. The inscription "Ganly's Geological Letters," printed in gold lettering in a black panel, appears on the spine of each volume, together with the years to which the letters refer—[Vol. 1] 1837-1838-1839 ; [Vol. 2] 1839-1840-1841 ; [Vol. 3] 1841-1842-1843. The index with which each volume opens specifies the districts visited and the folios of the relative letters.

It was in the course of the search in the summer of 1944 for the Agrological and Government Valuation Maps of Sir Robert Kane (See Department of Agriculture *Journal*, Vol. XLIV, page 10) that these letters were discovered in the General Valuation Office, 6 Ely Place Lower, Dublin ; subsequently, by the courtesy of the Commissioner of Valuation, they were lodged in the Royal Irish Academy. It may be recalled that prior to 1860, in which year the Ely Place premises were acquired by the Government, Griffith conducted his business from offices provided in his residence, 2 Fitzwilliam Place, South, into which he moved about 1828 ; until the latter year the office of the Boundary department was in Baggot Street when it was transferred to Griffith's new house.[11] Ganly, however, still refers to the office in Baggot Street in a letter dated 27th July, 1837.

While in Dublin during the winter months of the period 1841-49, Ganly devoted his evenings to the study of the practical sciences, particularly chemistry, mineralogy and geology ; also to the abstract sciences and languages.[12] At the age of thirty-two he entered Trinity College, taking his B.A. degree in 1849. During these years Ganly was transferred for a brief period—in 1847—to the Board of Works of which Griffith, in addition to his other appointments, had become deputy-chairman. Here Ganly was employed on the repair and construction of roads and bridges in the County of Roscommon, and also on drainage operations connected with relief works occasioned by the famine. In 1848 he would appear to have been again working as a valuator under Griffith—who now held three important public positions—for Ganly's

[9] Valuation Office letter book, *idem.* p. 27.

[10] See Part II of this joint contribution and *Nature*, December, 1944, vol. 154, p. 710.

[11] *Cf* evidence of Griffith before Select Committee, *supra.*

[12] For these and following particulars, see Valuation Office letter book (P.R.O. 2A-26-79, p. 110).

name appears in that capacity in the Town Book of Waterford city for the year indicated. He remained so employed until 1851 when he was notified that owing to the completion of the General Valuation his services would no longer be required.

Before noticing Griffith's references to the assistance he had received over the period covered by Ganly's letters, a reference to his acknowledgments of help during the earlier, or unpublished, stage of the Map is called for.

Reviewing the history of the Map from the year 1811, when the first outlines were made, to the date of its presentation to the British Association in 1835, Griffith in the course of his Presidential Address to the Geological Society of Dublin in 1836 stated :

> In the year 1815 numerous additional observations having been made by myself, I prepared a more perfect map which was exhibited at my lectures of that year. No material changes were made in the map from that period till the commencement of last year when in consequence of an engagement made by me at the meeting of the British Association in Edinburgh to present my Geological Map of Ireland at the meeting in Dublin, I carefully examined all my notes, at different periods, up to that time and having transferred them to the county maps I prepared from these accumulated materials the Geological Map of Ireland which I had the pleasure to present to the Association in August last . . .

Griffith then paid tribute to the help he had received from his friend Mr. Greenough, to the information derived from the maps of Mr. Weaver and Lieut. Stotherd, and "to those persons acting under my direction who traced for me the detail of several of the lines of geological boundaries. The most important of these observations were made by Mr. John Kelly in different parts of Ireland, by Mr. Samuel Nicholson in the northern part of county Antrim and by Mr. Patrick Knight in Mayo."

"These three gentlemen," pointed out Portlock, who was then contending with the problem of a geological survey which he had undertaken in the north, were in "the employment and pay of Government either in the Boundary or Valuation departments and from the nature of their acquirements and duties were peculiarly fitted to assist in such an undertaking. Mr. Kelly in particular as a leading man in both departments had every opportunity of applying very considerable powers of observation to advantage."[13]

Of the condition of the Map at this time, Portlock indicates that no record would exist, as it was not then published, but for the small "Index Geological Map" of the British Isles by Professor Phillips which appeared in 1838 "and as regarded Ireland was founded on Mr. Griffith's large unpublished Map . . ."

[13] *Rep. on the Geology of Co. Londonderry.* By J. E. Portlock, F.R.S., p. 64 ; Dublin, 1843.

The first volume of Ganly's letters (June 1837-April 1839) coincides with the period of the published maps of 1838 and 1839. The origin of these maps resides in the requirements of the Railway Commission of 1837. In their first Report dated 11th March of that year, the Commissioners, of whom Griffith was one, having referred to the very serious impediment in their progress by the absence of a suitable map of Ireland on which lines might be laid down, stated :[14]

> Colonel Colby at our request caused a diagram to be made of the whole of Ireland from the great triangulation, and a map to be compiled from the already completed portion of the Ordnance Survey, and the best county maps which could be obtained . . . The preparation of the map was entrusted to Lieut. Larcom of the Royal Engineers by whose unremitting exertions and ability the object has been effected ; and we are now in possession of a map far superior to any hitherto constructed . . . Mr. Griffith's unpublished Geological Map of Ireland—a copy of which will accompany our next Report—has proved very useful . . . In addition to the knowledge which this map affords of the geological structure and mineral products of the country, it has been of material assistance to us in pointing out those rich and populous districts which it would be at once most desirable and most easy to traverse by Railways.

In the Second and Final Report dated 13th July, 1838, the Commissioners expressed their regret that the map prepared by Lieut. Larcom did not accompany it ; the map was then and had been for a considerable time in the hands of the engravers "and partly from this cause, and partly from a desire to improve the delineation of the features of the country, by sketches taken on the spot" a greater delay had occurred than was anticipated. "We regret this the more," continued the Report, "because we are hereby deprived of an opportunity of representing the geological structure of the country, on a Map of such size and accuracy as a work full of important details necessarily requires. We have endeavoured to supply for the present a manuscript copy of this Map . . . and as a temporary substitute Mr. Griffith has delineated the most remarkable geological characters on a smaller Map which has been prepared for publication . . ."

This smaller map accompanied Griffith's "Outline of the Geology of Ireland" which formed the first Appendix to the Railway Report. It bears the inscription : "Geological Map of Ireland to accompany the Report of the Railway Commissioners, 1837, shewing the different lines laid down under the direction of the Commissioners and those proposed by Joint Stock Companies." (Signed) "Richard Griffith, April 28, 1838."[15]

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14 *First Report* of the Railway Commissioners, p. 6 ; London : Stationery Office.

15 *Atlas* to accompany *Second Report* of the Railway Commissioners, 1838 ; this atlas includes various maps illustrative of density of population, traffic and transport.

The large topographical map prepared by Larcom was not published until a year later. It is entitled: "A General Map of Ireland to accompany the Report of the Railway Commissioners showing the principal physical features and geological structure of the country, constructed in 1838 and engraved 1837-8. Scale one inch to four Statute miles—Richard Griffith, March 28, 1839." This map carries a certificate by Larcom: "The northern counties are reduced from the Ordnance Survey, the remainder from county maps and other materials connected by the Triangulation of the Ordnance Survey. This Map was constructed by order of the Government for the specific purposes of the Railway Commission."

Thus, it will be seen, that all circumstances united in enabling Griffith to bring to perfection his most ambitious project.

The revised edition of the 1839 map, ordered by the Treasury for general purposes, bears the same title, dates of construction and engraving, but adds the note: "The Geology revised and improved in 1853." With Griffith's signature appears the date, April 1855.

Griffith's acknowledgments may now be noticed. Explaining to the Select Committee of 1869 the distinction between the published map of 1839 and the later editions, he said:

> The geological map was made before the valuation began. It was corrected in detail, I admit, by the boundary surveyors, but it was originally made by myself during ten years between 1812 and 1822 . . . The engraved map of 1838 showed the boundaries of counties, baronies and parishes together with the boundaries of all rock formations; it showed the plan of the general dip of the stratified series and the position of the cropping up of the igneous or primary formations. The second map showed the same, only it was corrected . . . I employed the parties, *chiefly one man*, to revise the boundaries, particularly in the carboniferous series, which in most geological maps is put in one uniform blue colour, but I divided it into four series, which is of great importance in an agricultural as well as a geological point of view. My map is the only one ever printed in any country that so divides the carboniferous series . . . It was Mr. Patrick Ganly who was so chiefly employed.

Of the more general services rendered by his staff, Griffith on the same occasion stated:

> When the Valuators came into a field they required to go to every quarry to deduct it out of the arable land, and to put a smaller price upon the land injured by spore around it. I requested them to take the dip of the strata and every one of them did so for me . . ."

There is, however, a more interesting acknowledgment made by Griffith, in a calmer atmosphere than that of an Enquiry, a quarter of a century earlier, under circumstances which call for a word of explanation.

The suspension, notwithstanding many distinguished protests, of the *Ordnance Survey Memoir,* after the appearance in 1837 of the Templemore volume, led to the appointment in 1843 of a Committee of Enquiry into the relative facts of the publication, and the existing position as to material collected.[16] Between these years, about 1840, the contents of the geological office and museum established in Belfast were transferred to Dublin, while Portlock, the director, was requested to prepare for publication all the geological data collected for county Derry and the Tyrone barony of Dungannon. This he did brilliantly, his famous *Report,* already cited, appearing in 1843. The preface, it may be observed, records that "Even before publication the department has done some service to the cause of Geology by acting as a pioneer in this northern district to another great Geological work the Map of Mr. Griffith . . ." As to the *Memoir* Committee of Enquiry, it recommended in the same year "that the topographical geology of Ireland be committed to Sir Henry de la Beche as general director of the geological department for the whole empire . . ." This Report was published in 1844. It is in this connection that Griffith has left on record not only an enlightening acknowledgment of his indebtedness to his staff but an account of the manner in which his geological investigations had been made. The occasion was a letter addressed to the Chancellor of the Exchequer dated March 25, 1844, intimating that while he was unaware whether the Government had come to a final determination as to the Ordnance Memoir, he desired that some circumstances relative to the Geology of Ireland should be communicated to Sir Robert Peel.[17] The purpose of the letter is contained in the final sentence:

> *What we require here is a good fossilist,* and if such were appointed I think I could undertake the Geological department and complete it at a comparatively trifling cost to the public.

Having referred to the knowledge, by all the geologists of the British Empire, of his work, Griffith proceeded:

> The geological examination of the country has not been made in a rough or sketchy outline, but in great detail, the boundaries of each sub-division of every rock district having been carefully traced and laid down on the spot on the large ordnance plans (those on a scale of six inches to a mile) of every county which has been published, and on the old County maps where the Ordnance plans have not yet been completed. The field observations have likewise been transferred to the Ordnance County Index Maps on a scale of half an inch to a mile, so that I may say that the field work of the Geology of Ireland

16 *Report* of the Commissioners into the facts relating to the *Ordnance Survey Memoir* of Ireland : London, Stationery Office, 1844.

17 Valuation Office letter book (P.R.O. 2A-26-76. p. 64)

> is now nearly completed, and little remains to be done beyond the marking in of small igneous protrusions in certain localities. But the examination of the fossil remains of our slate and coal districts requires a careful examination. I have completed a very detailed examination of the fossil remains of the limestones of Ireland and I have had all the new fossils discovered lithographed and printed, a work on which I have already expended £600.

The succeeding paragraph refers to the work of his staff.

> I should mention that I have had much assistance in tracing the boundaries of the rock districts of Ireland from the persons employed under my direction on the Boundary Department of the Ordnance Survey and also on the Valuation. Having given them sufficient instruction in Geology, several of the boundary surveyors and the valuators, devoted their evenings (after the official business of the day had terminated) in tracing boundaries and in taking the dips of the strata. By means of such assistance, and my own labour . . . I have accumulated a mass of accurate information which could not have been collected by a public establishment without much delay and a very considerable expenditure . . .

It is for our geologists to determine the full extent to which Ganly was entitled to share in this appreciation.

Griffith then offered to place at the disposal of the Government all his "maps, sections and drawings, and other documents connected with the Geology of Ireland" together with his unique collection of fossils. "A vast quantity of the information I possess," he added, "is in my head and cannot be communicated until it has been committed to paper, but still if it be wished by the Government to transfer the work to other hands I shall not hesitate to hand over all my Geological maps and documents to the person who may be named . . ."

Whether the arrangement proposed in reply[18]—that Griffith should submit all his documents to the Professors of Geology of Oxford and Cambridge and to the Presidents of the Geological Societies of London and Dublin, at a time and place to be appointed—ever materialised is not at present known. There is, however, on record[19] a letter of Griffith's dated July, 1844, to the Rev. Dr. Buckland of Oxford, which intimated that he would "send over by the steamer a few of the large volumes of the Ordnance Maps on which the Geological observations have been laid down," also, some of his "sections, with the index maps of the several counties, coloured geologically," adding "one volume of the latter, together with my large geological map is at present in London in charge of Professor William Forbes at the Geological Society in London."

18 Valuation Office letter book, *supra*.
19 *Idem* (P.R.O. 2A-26-76. p. 180).

That Ganly's Letters were not submitted is a reasonable inference; their discovery in 1944 may be said, indeed, to constitute a centenary reminder of a significant event in the history of a famous geological undertaking. It is to be hoped that the publicity and interest aroused in this connection will lead to the discovery of the present habitat of Griffith's own documents which, though now mainly of historic interest, diligent enquiry has failed to locate.

At the Great Industrial Exhibition held in Dublin in 1853, Griffith's Map was exhibited with two cabinets of fossils, and in the following year he received the Wollaston Medal, admiration being then expressed "for one of the most remarkable maps ever produced by a single individual." In 1855 the map was again on view at the Exhibition held in Paris.

Of Ganly's later career, little remains to be said. When notified in 1851 that his services were no longer required, he proposed to emigrate to the U.S.A., and it is largely due to this circumstance that a record of his service has survived. Besides letters of introduction, Griffith provided him with a testimonial in which he gave a detailed history of the manner in which Ganly had been employed from 1827 to 1851.[20] "The scientific knowledge," he wrote, "acquired by you in College enabled you materially to assist me in the preparation of my Geological Map of Ireland and I must say that the extensive Geological observation made by you proved to be correct and generalization sound, being based on observation carefully made . . ."

If this emigration project ever materialised, Ganly's visit to the U.S.A. must have been of short duration for, in 1853, Griffith found further employment for him in the Valuation Office; from then until 1860, when, at the age of fifty-one, he retired on a small allowance, Ganly was mainly engaged in Boundary revision work and the measurement of towns. Letters from him at Leitrim in 1855 indicate ill-health "due to the severity of the weather"; his application for permission to hire a horse on which he might traverse the district allotted to him was granted after the usual cautious official enquiries as to cost.

Though Patrick Ganly lived to the ripe old age of four score and ten, dying at Donnybrook, Dublin, on the 29th October, 1899, nothing is known of his intellectual interests or scientific activities between the dates of his retirement and decease. One would imagine that a man of his considerable attainments and practical experience would have gravitated to the official Geological Survey of Ireland established in 1845. Perhaps the explanation that he did not may be found in the fact that Richard Griffith had not added the directorship of that institution to his numerous public appointments.

Thanks are due to the Commissioner of Valuation and his staff for many facilities kindly afforded and to Mr. Edward Keane of the Genealogical Office for his zealous enquiries as to the fate of Ganly's own papers. These, it is feared, are no more.

[20] Valuation Office letter book (P.R.O. 2A-26-79, p. 110).

II—GANLY'S GEOLOGICAL LETTERS

Ganly's geological letters are a series of day to day progress reports sent, usually at weekly intervals, although often more frequently, to Richard Griffith. With the exception of one group covering a period of about two months at the beginning of the series, the letters are concerned solely with giving an account of the work done from day to day, with frequent sketches to explain and amplify his mapping. The mapping was done on sheets supplied to Ganly from Griffith's office in Dublin.

Ganly never permits his personal affairs to obtrude themselves into his reports to Griffith. Occasionally he mentions a severe cold, contracted in the course of his arduous duties, or an injury to his leg, but only in explanation of having kept to the house for a day or so. Once (21 Oct., 1840) he writes: "The duty in this country [Co. Galway] is excessively laborious, and I fear that I cannot proceed much farther without taking a few days rest." But he took no rest; his reports continue without interruption until 6th January, 1841. The only protest at his hard fate appears in the curt entry: "Friday 25th December. On this day I did no work"; a pointed remark for there were other Christmas Days when he did work.

The group of letters referred to above were written mostly to John Kelly. They were also progress reports. It appears that Kelly was at first charged with the direction of Ganly's work, but later, when Ganly took up the special work of the final revision of the southern sheets of Griffith's geological map of Ireland issued in the spring of 1839, Griffith himself kept in close touch. The letters to Kelly, although mainly concerned with the survey, contain occasionally more personal matters.

Through these we get a glimpse of Ganly as a serious student, borrowing and purchasing books on mineralogy and conchology. There is a touch of humour once or twice. Ganly has been studying French grammar and wishes for something to read. He asks for a small French Testament for which he encloses half-a-crown. "If Mr. Foster be with you I am sure he would oblige by getting it for me; and I think that Mr. Eland (who is very pious) would not object to send it to me with a parcel." It seems from other indications that Ganly had difficulty in getting private parcels sent from the office.

During the period covered by this first group of letters, from 26th June to 30th October, 1837, Ganly was at work in the Connaught coal district, with the exception of the last fortnight when he was in Donegal.

The first letter of the second period is dated 28th March, 1838. Ganly writes from Listowel, having left Dublin on March 26th. From then until April 18th, 1839, he remained in the field in the south of the country, mostly in Cork and Kerry, with the exception of one brief period in Dublin. This break could not have been more than a few days, for, in a letter dated from

Clonakilty on 2nd August, he gives no hint that he was about to move, whereas the next letter, written at Ennistymon on 28th August, states that he left Dublin for that town on 21st August. Such sudden moves were frequent and were made at the direction of Griffith who seems to have pressed Ganly hard in making the maximum use of his undoubted ability.

This period of thirteen months was spent on the final revision of the southern sheets of Griffith's geological map which was actually being engraved at the time. This revision went on up to the very last minute. A letter from Ganly, dated 21st March, 1839, apologises for keeping "the two western sheets of the map of Ireland," and says that he had sent them off on March 19th. He adds a last-minute correction to be made in the mapping of the Great Island in Cork Harbour. The map was signed for printing by Griffith on 28th March, 1839. It was during this part of his survey that Ganly made use of his discovery that the current-bedding preserved in sandstone rocks could enable an observer to determine whether a stratum was in its original position or whether it had been inverted, and to decide, in the case of vertical strata, which side was originally uppermost; previously a very difficult problem in non-fossiliferous rocks. Ganly ultimately published his discovery (*Jour. Geol. Soc. Dublin.* Vol. 7, p. 164)[21] from which it appears that he may have conceived the idea earlier from observation on a river-bank in Co. Donegal, but the first known application of the method[22] was made at Fahan (Ganly always writes it Fawn) at the western end of the Dingle Peninsula. (See next page).

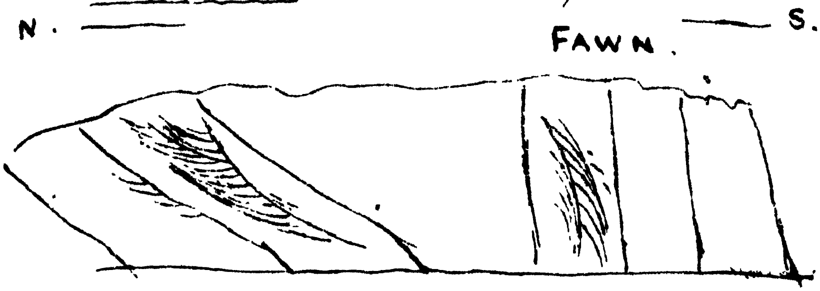
It is hard to see why this method of Ganly's received no real recognition until nearly twenty years after the discovery. He wrote a letter to Griffith (28th June, 1838) sending "plans and sections showing the sedimentary layers of Fawn." This letter is not known to have survived; but Griffith received it, for in a letter dated July 12th Ganly refers to the question again. "I regret to find that I have been as usual unhappy in conveying my meaning; for otherwise there could be no misunderstanding respecting the word "plan" as used in my letter of 28th ultimo on the subject of sedimentary layers." Thereafter no more is heard of the matter until presented to the Geological Society of Dublin except for passing mention on two occasions where Ganly used his method to decide the order of strata near Glengarriff and near Clonakilty.[23]

21 This note was published in 1856 in which year Ganly was elected an annual member of the Society. His name remains on the list until January, 1864. His address is given as 78 Capel Street.

22 In a paper recently published in the Proceedings of the Royal Irish Academy (Vol. 46 B p. 1) this method was used to help in working out the structure of the Dingle peninsula. Ganly's observations were made again a hundred years after he had done his original work.

23 John Kelly in a curious work, *Notes on the Errors of Geology, illustrated by reference to facts observed in Ireland*, London, 1864, gives an account of this use of current-bedding and says: "These facts were noticed by Mr. Patrick Ganly who made numerous drawings of this kind of lamination about Slea Head for Sir Richard Griffith" (See A. Lamont, *Nature*, Vol. 145 p. 1016). The officers of the Geological Survey of Ireland were obviously familiar with Ganly's work (Mem. G.S.I. sheets 160, 161, 171 and part of 172, p. 25, 1863).

these relations to indicate that the beds were in their natural position, that is, that their upper sides were uppermost; but on entering upon the nearly vertical strata at Fawn, I found the relations of the sedimentary layers to indicate that the strata were overthrown from their natural position, and that the upper sides of the beds were <u>undermost</u>: thus,



I am Sir,
Your very obedient
humble Servant
Patrick Ganly

Richard Griffith Esq

Facsimile of page of letter, dated 18th June, 1838.

Neither Griffith nor Ganly considered the map to be more than a stage in the representation of the geology of Ireland. Immediately the sheets were signed for press the work of revision began. Ganly was back in the field again by 7th May, 1839, this time in Carlow. There was little slackening in the pace of the work—in a sense it was more strenuous as movement from place to place was more rapid. It was no longer a question of settling down to work out some area with an approach to completeness as was the case when Ganly stayed for over a year in Kerry and Cork. Henceforward he moved from place to place checking geological boundaries at Griffith's direction. Some times, it is true, he would stay some months in one locality, as, for example, when he worked in the Clifden area for four months during the late autumn and the early winter of 1840. Usually the time spent between moves was a week or less.

It would not be profitable to give a detailed account of these letters, nothing so interesting as his work on Fahan occurs again. It is clear that Ganly gained in confidence in his own work and in the knowledge that his opinion was respected by his employer. He does not hesitate to write to Griffith to tell him very directly that the boundaries drawn and published were incorrect. Obviously he expected his new version to be accepted. The letters are a record of a remarkable, sustained effort of routine field-work, and they have a permanent value because of his keen observation and his wide knowledge of the rocks of the whole country. During the period covered by the letters he mentions having visited twenty-nine of the thirty-two counties.

Within his limitations, and those of the scientific period in which he worked, Ganly's achievement was considerable. His strong points were his feeling for structure and his recognition of lithological similarities over wide areas. He knew little about fossils, although he occasionally commented on the difference of the fossil content of different beds of a series ; but his keen eye enabled him to discover many fossil localities, and he collected assiduously for Griffith : bags, boxes and casks of "organic remains" were frequently despatched to Dublin. The classification of igneous rocks meant little to him ; granite, greenstone, metamorphic were terms that covered a multitude of types.

All through the letters there are scattered instances of his quick recognition of points of interest. He was the first to record glacial erratics of Galway granite as far to the south-east as Clonmel : "25th May [1839] . . . I may here remark that at Darling Hill [north of Clonmel] I observed boulders both of greenstone and granite amongst the limestone debris. The granite boulders are much rounded and vary in size from 10 inches downwards. They contain red felspar in considerable quantity and in this respect appear similar to the granite boulders which occur on the plains of Gort in the County of Galway." The author of this note is indebted to Ganly for two records of ice-scoring which are not recorded by any other worker.

His work after the publication of the map in 1839 consisted in re-examining the geological boundaries, trying to correct them and filling in gaps, particularly in the division of the rock of the Carboniferous period. Griffith was proud of his division of the Carboniferous into four "series" (see his report to the select committee of 1869). The permanent record of this work is embodied in the revised map of 1855 but Ganly's reasons for making alterations or confirming the boundaries are to be found in the letters. As it is quite possible that evidence which Ganly saw and recorded is now no longer available, the volumes of letters with the well-drawn sections and sketch maps may still be valuable apart from their interest for the history of geology in Ireland.

In no part of the country was his work so complete as in Cork and Kerry. It would not be claiming too much to say that his surveys there were the basis of all future geological maps of the area. Much of the rock of those two counties is unfossiliferous and Ganly was in his element as the mapping had to be substantiated on lithological and structural grounds alone.

The latest letter in the third volume is dated 23rd January, 1844. It is bound out of place at folio 296 among the letters dated November, 1843. It gives no hint that the work was finished. Ganly was at the time employed on the field maps of Co. Wexford, and was making plans to proceed to Co. Cork, but asked for a few days leave to attend an examination at Trinity College. Apparently while Ganly was engaged in his very strenuous field studies he was making a slow progress through the university. He entered Trinity College in the autumn of 1841 and graduated in 1849. Up to 1844 it is known that he was very actively engaged in the field and that at this time there was no hint that his work was about to stop. There is no record of his having taken up other duties until 1847 which suggests that he was still actively surveying and that somewhere there may be more letters. If these exist their discovery would add another chapter to the history of geology in Ireland.

PROGRESS OF SILAGE MAKING IN NORTH WEST CORK 1939-1948

By

P. O'LOAN, B.Agr.

The area discussed in this report is that part of North West Cork (for which the writer was Agricultural Instructor during the period under review) consisting of the Rural Districts of Kanturk and Millstreet and that part of the Rural District of Mallow comprising the Dispensary District of Charleville and the District Electoral Division of Liscarroll. It includes the valley of the Blackwater from its source to within six miles of Mallow and contains about 5,400 agricultural holdings of which 3,600 are over ten acres and of these just over 2,000 are between 30 and 100 acres in area.

The land varies much in type and quality. Around Charleville, near the Limerick border it might be regarded as part of the Golden Vale. In this section land which is on a slope or raised above the surrounding area is generally a deep heavy fertile loam, but flat or low lying areas are not free draining and, though fertile, are difficult to till, and are more suited to grass. Westward towards the centre of the area the soils are generally shallower, a considerable portion of them overlying a stiff clay subsoil, giving poor drainage, and a tendency towards the growth of rushes. A small part of this central area, however, consists of fertile free draining soil overlying limestone or dolomite, and a still smaller area of deep alluvial "inches" by the Blackwater and its tributaries. On the higher ground further away from these rivers much of the land overlies pencil rock. These are generally hungry soils, naturally deficient in phosphate and lime. A rim of hills on which large quantities of turf are produced surrounds the area on its southern and most of its western and northern sides.

The general farming system is based on summer dairying and the supply of milk to creameries for the manufacture of butter, cheese, cream, casein and chocolate crumb. A much smaller proportion of the farms is devoted to rearing store cattle, and this is also carried on to a varying extent on the farms where milk production is the main object. Some tillage has always been done, the bulk of the produce being fed to livestock. Prior to the war the use of artificial manures, especially phosphates on grassland, was fairly general and full use was made of the waste lime from the Mallow Sugar Factory as well as of the burnt lime from kilns in the area.

For many years hay was almost the only winter feeding for dairy cows and, though roots and concentrates were used to some extent, the condition of cows in the spring invariably reflected the weather conditions under which the hay was saved. The deplorably low condition of cows generally in most years was reflected not only in low milk yields but in extra high mortality in spring calves, and even in cows, following unusually bad hay years. To counteract this state of affairs the Department of Agriculture had, since its inception, endeavoured to popularise silage making with, unfortunately, little success. A renewed effort was made in 1932 when, at the suggestion of the Department, the Committees of Agriculture subsidised the construction of four small rectangular silos for demonstration purposes in each Agricultural Instructor's area.

Despite considerable effort in the matter of lectures and propaganda, this attempt to popularise silage making did not prove very successful, for by 1939 only one out of every four silos was being used for the purpose for which it was intended.

The next attempt to introduce ensilage into farm practice was made in 1939. In that year, the Department of Agriculture decided to subsidise the erection of six silos on fairly closely situated farms around a selected centre in each of five dairying districts. North-West Cork was one of the chosen districts. This time the silos were circular and were constructed of specially designed concrete blocks. An account of the demonstration work done with these silos during their first three years has been given in this Journal[1].

Progress in the practice of silage making in North-West Cork may be said to date from this effort. In the following nine years up to and including the 1948 filling season, silos were erected on a further 100 farms (more than one silo on some of them). While this rate of construction is far from spectacular, there are many features of it which indicate that it is no passing phase, but a movement which has all appearances of permanency and it is because of this that it is considered that some account of what has taken place here may be of general interest.

Despite such obstacles as scarcity of cement for silos and of manures for grassland, as well as the operation of the Compulsory Tillage Order, progress has been reasonably uniform over the years under review. Only in one year, 1941, was the number of silos built as low as five. Generally it ranged from eight to sixteen. Thus in 1947, when there was an acute cement shortage coupled with a most difficult spring for farm work, the number fell to eight, while under the more favourable conditions prevailing in 1948, it rose to seventeen. This figure would have been somewhat higher but for the fact that the £10 grant formerly available under the Farm Improvements Scheme for the construction of a silo was not available in 1948, except to those who had made applications under the 1947 scheme but had deferred building

[1] Journal Department of Agriculture, Éire, XL No. 1.

until 1948. The number of farmers who have indicated their intention of building silos for the 1949 season suggests that there will be no falling off in the rate of construction but rather a continued acceleration.*

The silos constructed have been consistently used. One had to be abandoned because it was constructed too close to a well and the seepage from the silo tainted the water. One farmer has given up silage making because he did not find it useful to him, but silage making in this area has passed the stage where the abandonment of it by an individual farmer through special circumstances or for personal reasons is likely to be interpreted by his neighbours as evidence against the value of silage. Over 95 per cent. of the silos in the area were filled in 1948.

Very many silos have been increased in height and capacity after a few years' experience of silage. Ten farmers have built a second silo and one of these has a third. This makes a total of 117 silos on 106 farms. Several farmers who have now one silo intend to build a second one in 1949.

While many farmers, especially the pioneers in their immediate locality, were first influenced to build a silo by the Agricultural Instructor, it has been a notable feature of the spread of silos that in many cases the final decision to build was taken on the advice of a relation who already had one. Thus cases could be cited where it was the experience and advice of a son, a father, a brother, a brother-in-law, a son-in-law, or a cousin which was responsible for the final decision to take up silage making. Of course it was often the influence of a neighbour which was responsible.

In the campaign begun in 1939, it was decided to concentrate on the best grassland area as being the area where silage making was most likely to fit in with the farming system. For this reason the six demonstration silos were built on farms in the district around Charleville. The later spread of silage making has shown clearly that its usefulness is by no means confined to such areas. At present about three-fifths of the silos in this area are located between Kanturk and the Cork-Kerry or Cork-West Limerick border in an area where the land is not intrinsically good grassland. At least forty of them are on farms in the western and north western strip of the area where the soil is shallow, overlying either stiff clay or "pencil," much of it naturally inclined to rushes, and on the hillsides close to where turf is cut on a large scale. It is probably in these hillside areas that silage is being most appreciated, as here meadows (except young ryegrass) are not fit for cutting for hay until rather late in the summer, by which time, due to high summer rainfall and frequent mists and drizzles, hay making is more than normally precarious. Many of these farms have streams coming down through the farmyard from the higher land, and so lend themselves to irrigation. In all cases good management and the use of farmyard and liquid manures or artificials, produce excellent crops of grass for silage.

* Twenty four new silos were built and filled in the summer of 1949, and six others were under construction.

The gradual development of ensilage in the area has given time to study the use of silage, the performance of the silos in operation, and to devise some improvements in details.

It was a general experience in the feeding of dairy cows that when silage was only introduced after calving, especially where the cows were in poor condition, it had an over laxative effect and the cows remained thin. On the other hand when the feeding of silage was begun four, or preferably six, weeks before calving, the cows soon began to lick themselves, their coats and condition improved and the improvement was maintained after calving. The feeding of cows on silage for this period before calving also resulted in strong healthy calves showing a high resistance to white scour and other infectious diseases. Indeed it was one of the most striking features of the experience in the feeding of silage that it was extremely rare to lose, through any of the common infectious diseases, a calf born from a cow which had been fed on silage for four weeks or more before calving; and this in an area where an average calf mortality of 33 per cent. has been recorded by Professor Murphy[2]. As Professor Murphy points out, had the calves which died lived, and been sold at the same price as the others, the money received for them would have been equal to the rent and rates of the farms investigated.

It was a common experience that if silage supplies ran out before pasture was available in spring, the cows did not take kindly to the consequent change in their feeding. It was also found that cows which were fed with silage up to the start of the grazing season did not show that insatiable longing for grass so common in springtime in cows on a diet of hay and roots with or without concentrates. The desirability, in the light of this experience, of feeding silage over a period extending from six weeks before calving (which normally takes place in the period February to May) until grass becomes available led to the construction of silos of larger capacity in proportion to the number of cows catered for, than had been the case in the earlier years. The block moulds loaned by Committees of Agriculture to farmers for the making of concrete silo blocks were designed to produce blocks for silos of 16 ft. inside diameter, and the first silos built in 1939 and for a few years after were all of this size. Most of these were 9 or 10 feet high. It was found that a silo of this diameter, even when raised to 12 feet, did not hold enough silage to give best results from its use on farms having more than 13 or 14 cows or other cattle. Silos up to 21 feet inside diameter have been constructed and most of those built in recent years have ranged from 18 to 20 feet.

The tendency has also been to increase the height where this could be done without making filling unduly difficult. In the 9 feet high silos built in the early years it was found that where filling proceeded fairly quickly the grass was over the top of the wall before the end of the second day's filling (sometimes before the end of the first day), and thereafter further additions of grass had

[2] Murphy, M. "Financial results on Mixed Dairy Farms in 1937-38." Statistical and Social Inquiry Society of Ireland.

to be built in a stack above the level of the silo wall. Apart from any question of labour in forking the grass up, this involved trying to keep the sides of the heap plumb, and the width exactly that of the inside of the silo so that, on the one hand, the grass would not overhang the silo wall and interfere with normal sinking, and, on the other hand, it would be wide enough to make good firm contact with the wall after sinking. This was not easily achieved, and it was found that where a considerable proportion of the grass had to be piled above wall level there was a greater "shoulder" of waste material around the top rim of the cured silage than was the case when there was no necessity during filling to heap the grass to any considerable extent above the top of the silo wall.

Very few of the silos built in recent years were less than 12 feet high and many were higher where sloping ground gave easy filling. Filling was further eased by leaving a gap in the top of the wall at the filling side. This gap was generally 2 blocks wide and 2 or 3 blocks deep (30 inches wide by 18 to 27 inches deep). This opening also facilitated the removal of the earth from the top of the silage.

While ease of filling was important, experience led to increasing emphasis on the choice of a site which would give convenience in feeding the silage. In this mainly dairying area, this normally meant convenience to the cow stalls and, if it could be achieved, having the feeding door of the silo on the same or a higher level than the floor of the cow stalls, rather than on a lower one. By careful choice and full development of the site, by excavating as far as drainage permitted and piling the material removed on the high side to form a filling bank, and by leaving the filling gap at the top of the silo wall, it was generally possible to combine convenience in filling and feeding with adequate height and capacity in the same silo. But, having used the chosen site for one silo it was often impossible to locate adjacent to it, a second silo having the same advantages. For this and other reasons it was usually found better policy to build one silo of generous capacity, rather than two small ones.

In the earlier silos it was usual, even where the silo was being sunk several feet in the ground, to excavate a circular trench lower still than the floor level around the outside edge of the excavated area, and in it to put down a foundation of mass concrete and stone to carry the silo wall. Later this was dispensed with in all silos which were sunk a few feet into the ground, and no ill results followed.

Again, in the earlier silos considerable trouble was taken to slope the floor towards the centre and from the centre towards the drainage outlet. Later, the floors were made level with a drainage opening on one side at floor level.

The construction and method of closing the emptying door was also simplified. In the earlier silos a shaped wooden door set in from the inside was used. This necessitated rabbetting the sides of the door opening to take and support the door. Later the opening was built plain (not rabbetted) and was closed with a flat sheet of iron supported inside the silo by nailing to it a wooden block which rested on the sill, the iron extending a foot beyond the edges of the opening. Corrugated roofing iron can be hammered flat to suit this purpose. This arrangement, though not entirely eliminating waste around the door, was at least as effective in this respect as the wooden door and much simpler. In a few cases the door opening was closed by building it up with concrete blocks set in lime mortar so that they could be removed later. This was found the surest method for eliminating all waste around the door. The usual size of door opening was 2 ft. 6 inches wide by 3 ft. 9 inches high.

During the war years reinforcing iron and even fencing wire for this purpose were practically unobtainable, and their use in silo construction was reduced to very low limits– sometimes too low. Reinforcing of the portion of the silo which is underground is obviously unnecessary. One point which must definitely be reinforced with complete circles of iron or wire is the portion of the silo immediately above the emptying door. It is undesirable to have a high ope going right out to the top. Ordinary barbed wire was found reasonably satisfactory as reinforcing when proper reinforcing wire was not obtainable.

Roofing also presented during the war and still does present considerable difficulty. When galvanized iron was plentiful loose sheets of this were laid on three rafters placed across the top of the wall, the wall being raised at one side to give the roof a slope. The sheets were held in place by three similar rafters placed on top of them, the projecting ends of the rafters being tied down to brads in the wall. Sometimes the iron was nailed to battens to form a somewhat similar roof in two or four permanently assembled sections. Either method, while possibly not ideal, was reasonably satisfactory when corrugated iron was freely available and reasonable in price. In its absence, thatch or bedding had generally to be used. If this is heaped directly on the earth it sinks down later, while the edge of it overhanging the wall is held up. When this happens rain water, instead of running off, soaks down through the bedding just inside the wall and causes damage to the silage. The difficulty can be overcome by supporting the litter on rafters laid across the top of the wall and covered with branches, but these supports must be very strong to carry the weight of the litter when it becomes wet. A saving in the amount of litter required, and consequently in the strength of the supports required to carry it, was effected by raising the top of the wall of the silo at two diametrically opposite points in the form of two small gables and placing one fairly strong beam resting on top of these, with lighter supports sloping down from this beam to the top of the wall to form a span roof.

The necessity for providing drainage away from the silo was made clear from one experience where no such provision had been made, and where the silo had been sunk in rather flat stiff clay. In this case, when the water table in the soil rose in winter, the outside water soaked in through the wall and rendered all silage below ground level sodden, strong smelling and unpalatable.

The crop used for ensiling in this area in almost all cases, was grass. In a few cases oat, vetch, and Italian Ryegrass mixtures were used. In one case such a mixture sown together with a permanent grass and clover seed mixture gave two heavy silage cuts and produced an excellent pasture afterwards. It seems clear, however, that in the future as in the past, grass will be the crop used. The majority of silo owners have used grass from fairly old meadows or leas, but some have been consistently using first year grass cut as early as 6th May under favourable conditions and in an early season. Direct seeding of land to grass after tillage without a corn crop has made some progress in this area in the past few years. In such cases grazing and not mowing, in the first years after laying down, is the general practice, but a difficulty often arises in the second spring in that growth of grass is extremely early and vigorous, but the land is too wet and soft to carry stock. In a wet spring and especially on land with a stiff clay subsoil, so common in this area, such grass is likely to go far beyond the right stage for grazing before cattle can be put on it, and here a silo has proved of great value in enabling this early flush of grass to be stored, leaving the field available for grazing for the greater part of the season. It would seem probable that newly sown grass, whether used in such circumstances as here mentioned or sown specially for silage, will figure increasingly in silage making in the years ahead.

Of the six farmers who built demonstration silos in 1939, two made A.I.V. silage in that season, two molassed silage, and the remaining two used no treatment. In the following season two different farmers made A.I.V. silage, two others molassed silage, and the remaining two untreated silage. Acid for A.I.V. silage was not obtainable in 1941 owing to the war. The experience of the previous two years had not, however, shown any obvious advantages in A.I.V. silage over either of the other two types in the circumstances in which these trials had been carried out[1]. Consequently the use of acid for the treatment of grass in silage making has not been adopted. Further trials of this method have recently begun in conjunction with Co-operative Societies in the area. Molasses has come to be used on a fair proportion of the farms where silage is made, and the farmers who use it are generally satisfied that its use is justified where a very young succulent or very clovery type of herbage is being ensiled. In 1948, twenty-three farmers used molasses. The majority of those making silage have used no treatment and, by following the instructions given, have made silage which, judged on proportion of waste, appearance, smell, palatability, and the general results obtained from feeding to cows and store cattle, must be regarded as excellent.

[1] Journal Department of Agriculture, Éire, XL No. 1.

The question of choice of site, and development of the chosen site so as to get the highest possible silo without making filling unduly difficult, has been mentioned. The use of elevators in silo filling, which may follow closely on rural electrification, would change the whole approach to this aspect of silo planning. It would remove present limitations as to height of silos, do away with the necessity for sinking them in the ground and make convenience in feeding practically the sole consideration in choice of site; while the amount of silage to be made on the farm would be the main consideration in determining the height of the silo.

The use of silage on the farm involves the transport of a large weight of heavy material from the silo to the stalls and several farmers in the area have improvised a barrow of large capacity on two wheels (pneumatic when obtainable) for the purpose. A great need is felt, however, for a suitable type of low-loading, pneumatic-tyred, four-wheeled truck on which a man could haul up to half a ton of silage along a fairly level concrete path.

Looking back on the failure of the 1932-33 effort to popularise silage making, and comparing it with the fairly satisfactory degree of success which attended the 1939 campaign in this area, some conclusions may be drawn for guidance in the future.

The silos built in 1932-33 were rectangular structures of mass concrete. The walls were not plastered inside nor were the inside corners rounded and the door was very large as a rule. The silo capacity was generally small. In the light of present experience it is easy to see that such a combination could only lead, as it did, to an extremely high proportion of waste. "Rotten" silage thrown out of a silo is amazingly slow to complete the process of decay, and the look of a large heap of it near the silo is neither an incentive to the farmer who made it to repeat the process, nor to his neighbour to embark upon it.

The 1939 silos were, of course, all circular. The greatest care was taken in the construction and internal plastering to have them as perfect as they could be made in the light of our knowledge at the time. The closest supervision was exercised at all stages of construction and filling, not only of the silos built in 1939 but of all silos built in subsequent years. The result was the production in all cases of a very good quality silage and a very moderate proportion of waste—a proportion which has since been further reduced with greater experience and with an increase in the capacity of the silos. This reduction in the proportion of waste has undoubtedly been the biggest factor in the greater success of the 1939 effort, and it should be kept well to the forefront in any future attempts towards the popularisation of silage making.

Lest the contrary might be inferred from what has been said here, it is not intended to imply that good silage with a very reasonable proportion of waste cannot be made in a rectangular silo. While the circular block silo has everything to recommend it from the point of view of ease and cost of construction, ease of packing and confidence in the results that will be obtained, a rectangular silo can be quite satisfactory, provided that the inside corners are well rounded, the inside surface smoothly plastered and that the minimum dimensions correspond to those found satisfactory in the case of circular silos.

In this area three moulds for making concrete silo blocks were provided by the Committee of Agriculture and were given on loan, free of charge, to farmers who wished to make their own blocks. Farmers who preferred to purchase ready-made blocks were able to obtain them from a firm in the area engaged in the manufacture of concrete pipes, roofing tiles, etc. About one-third of the silos were built with purchased blocks and two-thirds with home-made blocks.

The experience here has shown quite clearly that not only is silage an excellent means of storing summer grass for winter use with most of its nutritive qualities intact, but that it is a system which is entirely independent of wet weather. In the early years of this period the principle was adhered to that cutting of grass for silage should not be done when it is very wet as, for example, immediately after rain, and that it should be put into the silo with as little adhering moisture as possible. Later experience has shown that the greatest amount of moisture which can possibly adhere to grass after it has been carted in to the silo on an ordinary hay cart, irrespective of weather conditions at or after cutting time, is no deterrent to the making of first-class silage. Even heavy thunder showers during the course of filling have had no ill effects. On the other hand the use of even slightly wilted grass filled during hot sunny weather would seem to be associated with the few cases where mouldy patches occurred in the silage.

INVESTIGATION INTO APHOSPHOROSIS AND GRASSLAND CONDITIONS IN THE MIDLANDS OF IRELAND

By

S. CURRAN, M.Agr.Sc., Animal Nutrition Department, University College, Dublin.

Nutritional disorders in livestock grazing on certain pastures in Co. Offaly were investigated in 1945 by Professor Sheehy and J. O'Donovan (Instructor in Agriculture). As a result of experiments carried out at many centres in that county, the disorder commonly known as "Bog crook" or "Bog lame" was found to be due to a deficiency of phosphorus in the herbage grazed. The early investigations were reported by Sheehy (1) and O'Donovan (2), who in conjunction with other workers (3) subsequently issued a fuller account of Aphosphorosis in Offaly. The disorder, it was discovered, could be cured and prevented by supplementing the diet, *i.e.*, the phosphorus-deficient herbage, with phosphates, or by raising the phosphate status of the pastures by applications of phosphatic fertilisers. These initial investigations showed that a very large area of Co. Offaly was affected, and cases of cattle showing symptoms, some more severe than others, were reported from many districts, especially in moory or semi-moory land. Affected animals were also found on neglected upland pastures.

In 1947, investigations were extended into the counties in the neighbourhood of Offaly; these were continued in 1948 and into early 1949. This was made possible by a special grant from the Department of Agriculture to the writer, who worked under the direction of Professor Sheehy.

The following counties were dealt with—Laoighis, Offaly, Kildare, Meath, Westmeath, Longford, Galway, Roscommon, North Tipperary and, to a lesser extent, Sligo.

The procedure adopted was to visit, during the growing season, in conjunction with the County Instructor who in all cases kindly co-operated, the districts in which Aphosphorosis was most likely to occur, and to proceed with the analyses in the laboratory in the winter. Samples of herbage, and a limited number of soil samples were collected for analysis. During the 1947 season herbage samples were taken only from those farms on which animals


The cross hatched portions represent areas which in the general survey conducted were found to be affected by Aphosphorosis
The affected areas in Co Offaly are represented on a map which accompanies the article on Aphosphorosis in Offaly in the Journal of the Dept of Agriculture Vol XLV
Co SLIGO
SLIGO
Co ROSCOMMON
Co LONGFORD
LONGFORD
Co MEATH
Co WESTMEATH
ATHLONE
Co GALWAY
Co OFFALY
Co KILDARE
Co LAOIGHIS
Co TIPPERARY
THURLES

usually showed clinical symptoms of Aphosphorosis. In 1948 it was decided to take samples also from farms where stock were unthrifty, milk yields low, sterility common, and from pastures in areas where such troubles appeared to be due mainly to phosphorus deficiency. Occasional samples were taken from good pastures in the neighbourhood of affected lands, and also from pastures which had been treated with phosphatic fertilisers in order to compare their analyses with samples from affected lands.

In the following pages a summary of the conditions existing in each county visited is given, together with analytical results of herbage and soil samples. A map, in which the districts affected by Aphosphorosis are roughly shown, is also appended. The affected areas of Co. Offaly are shown in the map which is included in the report of Sheehy and co-workers (3). While a general survey was made, systematic and full examination was not attempted. Centres around which Aphosphorosis occurs are indicated, but the disorder in less pronounced fashion extends over areas between these respective centres.

COUNTY LAOIGHIS.

Cattle showing very severe symptoms of Aphosphorosis as described in publications (1), (2), and (3), are common along the Kildare and Offaly borders of this county. Cases were met with all through the county from Portarlington in the north, to Rathdowney and Wolfhill in the south. Although some severe cases were encountered on sound though neglected upland grazings, the majority of affected animals were those confined to moory and semi-moory pastures during the grazing season.

The herbage of the moory grazing consists mainly of sedges. Grass species are sometimes found but usually in very small quantities, and these are types generally associated with low fertility, *e.g.*, Yorkshire Fog and some Agrostis species. Wild white clover is present in most of these moors, and, although very much stunted, it still persists, especially where the herbage is closely grazed. In almost all cases the dominant weeds are, Scabious, Knapweed, Selfheal, Pennywort, and some Rannunculus species. Most of the upland grazing consists mainly of Agrostis species, with Crested dogstail, Yorkshire Fog, Plantains, Daisies, Selfheal and Knapweed. In many of these dry upland pastures small patches of sedge are beginning to make their appearance.

Aphosphorosis in cattle in Co. Laoighis is known locally as "Bog lame" and "Rheumatism." It had always been associated with the wet pastures or moors in close proximity to the bogs. Many farmers were of the opinion that wet lying brought about this "rheumatism," but they had no explanation to offer when similar trouble was experienced with cattle on dry upland

pastures. Changing the stock to dry upland sometimes effected improvement, and this practice was often adopted. In many cases, however, when no great improvement was brought about by change of pasture, owners resorted to local "cures" which generally proved useless.

Farmers have observed also that high yielding cows are most susceptible to "Bog lame." The tendency for such animals to pick up and chew with relish pieces of sticks, bones, leather, etc., was observed. Good milkers are usually the first to show symptoms of stiffness, creaking joints and abnormally long hooves. In the case of heifers, slowness to reach sexual maturity is common, and on many farms temporary sterility in cows is often experienced, some cows producing a calf only every two or three years.

In general, winter feeding consists mainly of poor quality hay, most of which, it will be realised, comes from land deficient in phosphate, with mangels and turnips. A small minority, when conditions allow it, feed some crushed oats or kale. No attempt is made to supplement the grazing during the summer and autumn months, and cattle are compelled to exist on phosphorus-deficient pastures for most of the grazing season.

In many places, due to low fertility status, the soil is unable to produce adequate quantities of grass—even poor quality material. On some of the farms visited in July it was almost impossible to collect a sample of herbage for analysis. The low-lying moors, however, produce plenty of sedge, which in the early stages is reasonably palatable to all types of stock, but as it matures it is less well grazed and is left to wither down and increase the underlying 'mat' of decaying vegetation. Much of the moory grazing in the Barrow Valley area is subject to flooding, which is a source of discouragement to many farmers who would otherwise manure those low-lying areas.

The practice of buying in extra calves is adopted in many districts. Sterility in cows keeps the calf-crop low with the result that calves and "fresh" cows are often purchased, and the older cows which become unproductive are sold off at nominal prices. Losses incurred from such procedure are never calculated.

In the Wolfhill area the cattle have to graze on wet upland pastures overlying shale or "sligeach." Due to the impervious nature of the sub-soil, drainage conditions are very bad. Mole-draining ploughs supplied by the Co. Committee of Agriculture in the past were made little use of, as tractors were not available. In many areas, where lack of proper drainage causes trouble, farmers complain that if one man cleans up the drains on his own land it is of very little benefit unless his neighbour does likewise.

Table I gives the relevant analytical data in respect of those pastures in Laoighis which have been sampled, and on all of which either pronounced or incipient Aphosphorosis occurs.

TABLE I.

No.	Type of Pasture	Manurial Treatment (if any)	% P_2O_5 in Herbage	% Crude Protein in Herbage	AVAILABLE PHOSPHATE IN SOIL (lbs. per acre)
L. 1	Upland	Untreated	.50	13.8	8.0
L. 2	Moor	,,	.34	14.8	11.2
L. 3	Moor	,,	.29	14.3	4.8
L. 4	Upland	,,	.54	13.6	8.0
L. 5	Semi-moor ..	,,	.49	15.3	4.8
L. 6	Semi-moor ..	,,	.45	16.6	—
L. 7	Moor	,,	.39	15.2	4.8
L. 8	Moor	,,	.29	12.3	—
L. 9	Moor	,,	.36	11.7	—
L. 10	Moor	,,	.38	11.8	—
L. 11	Upland	,,	.49	13.3	—
L. 12	Semi-moor ..	,,	.50	12.3	—
L. 13	Semi-moor ..	,,	.49	13.4	—
L. 14	Moor	,,	.29	12.3	—
L. 15	Moor	,,	.44	13.1	—
L. 16	Moor	,,	.45	13.6	—
L. 19	Moor	,,	.41	12.0	—
L. 20	Moor	,,	.33	10.2	4.8
L. 21	Moor	,,	.49	10.3	—
L. 22	Wet Upland ..	,,	.50	15.5	3.2
L. 23	Upland	,,	.58	—	4.0
L. 24	Upland	,,	.44	14.3	3.2
L. 25	Upland	,,	.49	—	4.8
L. 28	Moor	,,	.34	—	—
L. 29	Semi-moor ..	,,	.44	—	—
L. 30	Semi-moor ..	,,	.34	—	—
L. 31	Upland	,,	.43	—	—
L. 32	Semi-moor ..	,,	.43	—	—
L. 33	Moor	,,	.32	13.3	—
L. 34	Semi-moor ..	,,	.37	—	—
L. 35	Upland	,,	.48	—	—
L. 36	Upland	,,	.39	—	—
L. 37	Semi-moor ..	,,	.40	—	—
L. 38	Moor	,,	.32	15.5	—
L. 39	Wet Upland ..	,,	.39	—	—
L. 40	Upland	,,	.46	—	—
L. 41	Upland	,,	.49	—	—
L. 42	Moor	,,	.33	10.3	—
L. 43	Moor	,,	.35	—	—
L. 17	Moor	6 cwt. Semsol /ac.	.67	15.9	—
L. 18	Moor	Untreated (control)	.45	11.5	—
L. 26	Moor	3 cwt. Semsol /ac.	.66	17.6	5.6
L. 27	Moor	Untreated (control)	.48	15.0	4.8

(Results for herbage expressed in percentages of Dry Matter).

From the figures in Table I it will be noted that the phosphate (P_2O_5) content of the upland pastures ranges from 0.39% to 0.58% P_2O_5. In the moory and semi-moory pastures the range is from 0.29% to 0.50% P_2O_5. According to Orr (4), the average P_2O_5 content of natural pastures in Britain is 0.67%. Marston (5) states that at least 0.80% P_2O_5 in the herbage is necessary for good health and production in the case of cattle. In the work reported by Sheehy and co-workers (3), it was shown that the herbage phosphate, on good land, reached 1 per cent., while that of the moors and some upland pastures in Offaly, on which cattle develop pronounced symptoms of Aphosphorosis, contains less than 0.4% P_2O_5. Less pronounced Aphosphorosis occurs where the herbage phosphate ranges from 0.4 to 0.6%.

Examination of the figures in Table I would, in the light of the foregoing comparisons, lead to the conclusion that all the pastures from which the samples were taken were such as would produce either pronounced or incipient Aphosphorosis. The history of the stock on these farms was actually one of Aphosphorosis, pronounced or incipient, except where a good deal of hand-feeding in the way of concentrates was practised.

A couple of tests to determine the effects of phosphatic manuring in Laoighis were made, and the results appear at the bottom of Table I. It is shown that when "Semsol" was applied to "Bog lame" pastures, the effect appeared as an improvement in the phosphate and protein content of the herbage. The disappearance of "Bog lame" in the stock on both of these farms after the application of "Semsol" was noted by the owners.

The limited number of soil samples analysed for "available phosphate" content show that the fertility status in respect of this element is "extra low" or "very low."

The *p*H values of these soils generally range from "slightly acid" to neutral. A few samples of upland soil had *p*H readings as low as 5.4.

In general throughout the county, the main losses would seem to result from unthrifty stock. Failure on the part of the farmer to recognise the early symptoms of Aphosphorosis in his stock, and the interpretation of "bone-chewing" and "rag-eating" as nothing more than a habit in some of the best milch cows, are factors which contribute largely to the widespread incidence of the disorder. During the last ten years, whatever artificial manures were available were applied to tillage crops, but none to the grazing. Lack of proper drainage is another responsible factor.

The abundance of local cures for "Bog lame" and "rheumatism" would seem to indicate that the disorder was regarded by popular opinion as arising from causes not associated with the feeding. In some areas, roadside grazing was practised as a remedy for "Bog lame": the improvement which was thus frequently effected is no doubt explained by the better quality herbage usually found by the roadside.

In Co. Laoighis, apart from a limited number of cases of pronounced Aphosphorosis, considerable and widespread losses occur annually from temporary sterility, low milk yields and unthrifty young stock—all resulting directly or indirectly from inadequate supplies of phosphates. Wherever phosphatic manures have been applied, beneficial effects have been noted on the pastures and on the stock grazing them. Flooding and poor drainage are factors which contribute largely to the low standard of fertility of many moory areas in Co. Laoighis.

CO. KILDARE.

Aphosphorosis has been known in this county for generations under various names, such as, "Bockynamona," "Bockamone" and "The Bocky." Cases similar to those in Laoighis were encountered in Co. Kildare, some on upland grazing, but the majority on moory land. Really bad cases are not common, although farmers tell of cows they had disposed of because they were so badly affected that they grazed on their knees. Border-line cases are, however, very common. Cows showing depraved appetites, emaciated appearance and creaking bones, are very common. Slowness to reach sexual maturity is prevalent in heifers, and temporary sterility in cows is also widespread. On many farms young stock are stunted and unthrifty.

The vegetation on most of the moors is scanty, and consists mainly of sedge with some Yorkshire Fog, Knapweed, Scabious, etc.—very much like the moory pastures of Laoighis. As stated earlier, it is on these moory pastures that the most cases are found.

Particularly bad areas were encountered in the Kildangan district, and in the Pluckerstown area, Kilmeague, almost every farmer has a few animals affected each year. Quite a good number of farmers had used meat-and-bone meal as a remedy with good results, but they have found difficulty in obtaining this meal except in very small quantities.

In the Ballymore-Eustace area, the disorder is not so common in so far as the observance of clinical symptoms is concerned, although even on

comparatively well kept farms, cows have been noticed occasionally to chew pieces of sticks, rags, etc. Winter feeding in this district is somewhat better than that of the low lying areas, and crushed oats and concentrates are fed in addition to hay and roots.

In the Nurney district of South Kildare the disorder is known for generations. Near the Wicklow border—in the Brannockstown district, which is hilly—unthrifty stock were observed on many farms. Sterility in milch cows is common here, and brittleness of bone, as shown by the occurrence of fractures, has been reported. Such symptoms as depraved appetite, long hooves, and creaking bones, are not taken into serious consideration, although many owners realise that such symptoms very often show up in cattle grazing poor quality herbage.

In the Mylerstown district, where some very advanced cases were met with, many farmers have experienced so much loss in the past that when they now notice early symptoms of "Bockynamone" in their cows they sell them off at reduced prices. Some of the land in this district is reasonably dry and apparently would respond well to phosphatic manures.

In the Kilkeaskin and Drehid areas around Carbury, "Bog lame" is well known. On some of the farms in these areas, the tendency for cows to remain lying for long periods has been noticed. They are slow to rise and when up, are slow to move, some being very stiff. The land in this district is moory, with sedge as the dominant herbage species.

In the low-lying districts of Co. Kildare, as in Co. Laoighis, there is scarcely any change of pasture for grazing animals. The upland portion of most of the farms is under tillage, and in a good many cases the only upland would be a few small paddocks near the house. On many farms even where upland is available for grazing the cattle are kept on the moors for the summer in order that they may have a constant supply of water.

Quite a few farmers have noticed that the disorder is usually more widespread in a dry season, and more cases of temporary sterility in cows are experienced when there are prolonged spells of dry weather while the cows are on grass.

In Table II are given the relevant analytical data in respect of the pastures sampled in Co. Kildare, on all of which, except K. 10, Aphosphorosis occurred either in a mild form or with pronounced symptoms.

TABLE II.

No.	Type of Pasture	% P_2O_5 in Herbage	% Crude Protein in Herbage	AVAILABLE PHOSPHATE IN SOIL (lbs. per acre)
K. 1	Semi-moor	.47	16.9	—
K. 2	Moor	.41	15.5	-
K. 3	Moor	.54	15.3	—
K. 4	Moor	.42	16.6	—
K. 5	Moor	.42	15.4	—
K. 6	Moor	.47	14.8	—
K. 7	Semi-moor to Upland ..	.48	12.2	11.2
K. 8	Semi-moor	.49	12.1	—
K. 9	Moor	.42	13.2	6.4
K. 10	Good Upland	1.11	15.7	—
K. 11	Upland	.53	15.5	8.0
K. 12	Semi-moor	.42	14.7	11.2
K. 13	Semi-moor	.36	13.8	6.4
K. 14	Semi-moor	.47	14.1	4.8
K. 15	Upland	.51	15.9	8.0
K. 16	Semi-moor	.36	11.3	11.2
K. 17	Upland	.39	12.6	8.0
K. 18	Upland	.47		-
K. 19	Semi-moor	.44		
K. 20	Semi-moor	.34	13.2	—
K. 21	Semi-moor	.34		—
K. 22	Moor	.33		-
K. 23	Moor	.33		—
K. 24	Semi-moor	.36	-	—
K. 25	Semi-moor	.35	—	—
K. 26	Semi-moor	.36	14.3	—
K. 27	Moor	.55	16.6	—
K. 28	Moor	.33	—	—
K. 29	Moor	.34	—	—
K. 30	Moor	.46	—	—
K. 31	Upland	.47	15.9	—
K. 32	Semi-moor	.44	—	-
K. 33	Moor	.40	—	—

It will be noted from the figures in this table, that all samples except one (K. 10, which was taken from a good upland farm), are low in phosphate (P_2O_5) content. Sample K. 10 is from a well kept farm in the Kilrush district near Athy, on which both young stock and milch cows are in excellent condition, and show quite a contrast with the surrounding farms where "Bog lame" is well known. Sample K. 8 is from the same district, but from a farm on which the disorder occurs regularly, and one which is more or less representative of the other farms in this area. The figures for both phosphate and protein content in the herbage of these neighbouring farms, namely, K. 8 and K. 10, are worth comparison.

The protein content in many of the moory and semi-moory pastures appears to be somewhat higher than would be expected. Some samples were, however, collected when the sedges which form the bulk of the herbage were immature, and this may account for the reasonably good protein content.

The limited number of soil samples reveal low "available phosphate" status.

Conditions in Co. Kildare would appear to be much the same as those existing in Co. Laoighis. Unthriftiness in all types of cattle is fairly widespread especially in the low-lying districts, and causes serious economic losses annually. As in Co. Laoighis, there are abundant local cures for "Bog lame" in Co. Kildare, ranging from hoof-paring and roadside grazing, to drenches of lime water, ale and sulphur, etc. Quite a good number have in recent times been successfully using meat-and-bone meal as a remedy. All admit that their pastures need manuring, but complain of poor drainage or flooding as being a hindrance. Unfortunately, in many of the poorer districts, poor quality animals are regarded as normal, and it is only when a beast shows severe lameness or emaciation that the owner begins to realise that all is not well.

In Co. Kildare the main losses from Aphosphorosis arise from unthrifty and unproductive stock. The losses arising from casualties or diseased animals disposed of at very low prices, are small by comparison.

CO. GALWAY.

The disorder has been known in Co. Galway for generations under various names such as "Cripples," "Crupagh," "Bog lame," "Galar Crupagh," and in Connemara as "Lisbroon." The symptoms observed in affected stock are similar to those found in the midland counties. Some very bad cases were encountered throughout the county. The disorder is prevalent along the west bank of the Shannon, south of Eyrecourt in the low-lying "callow" lands, where the usual symptoms of unthriftiness are in evidence over wide areas. Depraved appetite is very common, as also is temporary sterility. These callow lands are composed mainly of sedgy vegetation, with very little grass. In the Clonfert callows, sheep, though less susceptible to Aphosphorosis are not very thrifty either, especially near the river bank. Most of the cattle observed here showed stiffness of gait. In the Aughrim district some of the farms are never without a case of "Crupagh" and some very advanced cases were met with here. The feeding of meat-and-bone meal, on the advice of the County Instructor, has given excellent results with some very badly affected animals in this area.

In the Ballycrissane district near Ballinasloe, the disorder occurs regularly on the moory pastures. Stiffness and temporary sterility are common in cows in this district, and poor quality grazing is very much in evidence.

In the northern portion of Co. Galway the disorder is not unknown, although severe symptoms were not observed in many animals. Unthriftiness in young stock is evident, however, on many farms. Sterility is also common.

Some farmers in the Kilbannon district, near Tuam, had observed symptoms of "Crupagh" in horses grazing the low-lying pastures, and are convinced that it is the same disorder as that of cattle.

In north Galway there are some large stretches of "mountain" grazing, which consists mainly of heather, sedges, and ferns. The land is not elevated, and derives its name from the type of herbage found there, which is similar to that found on the hills. The soil is very shallow, overlying limestone which can be seen bare in many places. Stock on this type of land show depraved appetites and poor condition. Some farmers have attempted to clear small areas of this land where the application of phosphates has given good results. It has been noticed that the manured portions are well eaten down by stock.

Good winter feeding is practised by many farmers in the north of the county, a fact which may account for the non-occurrence of extremely bad cases there. Cows, which undoubtedly show early symptoms after the grazing season, build up reserves during the winter and, although they never reach high standards of production, their condition is accepted as normal and does not cause any undue alarm to the owners.

In the Kilconly and Milltown districts near the Mayo border, the incidence of "Crupagh" is well known, but farmers recall having seen much worse cases on the other side of the border, in Co. Mayo.

The disorder is known in the south of the county as "Bog lame" and "Cripples," but seems to be most common in cattle on "mountain" grazing. This mountain grazing is of a different nature from that found in the north of the county. Here the land is higher, and is of a black peaty nature. The herbage is mainly heather, and the mountain grasses are scanty and stunted. Farmers in this district (Derrybrien area) seldom keep more than two or three cows, which are kept on the "mountain" during the summer. Sterility and depraved appetite are common, and owners have noticed that if cows are kept too long on the "mountain" they develop stiffness and bone disorders. It has been noticed also that when brought off the "mountain" the cows instinctively go for the manured portions of the lower lands. The Hereford breed seems to be the most popular in this area, as it is claimed that Shorthorns are more liable to develop "Crupagh" when left too long on the "mountain" pasture.

In the Oranmore area, unthriftiness and temporary sterility have been observed by farmers in cattle grazing turloughs or dry lakes. These turloughs, also known in the north of the county, produce very little vegetation except sedges which are generally stunted—in fact it was found difficult to collect a sample for analysis from some of them.

In west Galway—in the Connemara district—the disorder is known as "Lisbroon." Cows are rather scarce, and most of them show symptoms of Aphosphorosis. Owners realise that poor quality grazing is the cause, but had

never heard of any remedy for the trouble. When symptoms became more pronounced the cows would be sold off and new ones introduced. Sheep production is the main source of income, and cows are kept only for domestic milk supply.

The disorder is known on the poorer lands around Oughterard more by unthriftiness and depraved appetite than by the more severe clinical symptoms. Fairly good winter feeding prevents the onset of more severe clinical symptoms.

In Table III are given the relevant analytical data for the herbage samples collected in Co. Galway. All samples represented in this table, except G. 3, G. 6, and G. 32, are from farms where Aphosphorosis, pronounced or incipient, was evident.

TABLE III.

No.	Type of Pasture	% P_2O_5 in Herbage	% Crude Protein in Herbage
G. 1	Semi-moor	.36	13.1
G. 2	Moor	.44	14.3
G. 3	Upland	.46	16.2
G. 4	Upland	.37	14.0
G. 5	Upland	.37	12.6
G. 6	Good Upland	1.08	19.3
G. 7	Upland	.37	13.8
G. 8	Semi-moor	.29	11.2
G. 99	Moor	.35	12.0
G. 10	Upland	.46	14.8
G. 11	Semi-moor	.34	14.1
G. 12	Moor	.31	11.5
G. 13	Upland	.42	14.7
G. 14	Moor	.32	—
G. 15	Moor	.30	—
G. 16	Moor	.35	—
G. 17	Moor	.38	14.1
G. 18	Upland	.41	—
G. 19	Moor	.32	—
G. 20	Moor	.35	—
G. 21	Upland	.30	—
G. 22	Upland	.44	12.9
G. 23	Upland	.43	—
G. 24	Semi-moor	.30	—
G. 25	Moor	.37	—
G. 26	Moor	.32	—
G. 27	Upland (heather)	.26	11.3
G. 28	Upland	.51	—
G. 29	Upland	.47	—
G. 30	Moor	.42	—
G. 31	Semi-moor (heather)	.22	12.2
G. 32	Good Upland	.79	—
G. 33	Upland (wet)	.38	—
G. 34	Semi-moor (turlough)	.30	—
G. 35	Moor (heather)	.14	—
G. 36	Moor	.46	—
G. 37	Moor (hay)	.27	—

It will be noted that with the exception of samples G. 6 and G. 32, both of which were taken from good upland pastures, the samples analysed are low in both phosphate (P_2O_5) and protein content. Sample G. 3 was taken from a field in the Laurencetown district outside Ballinasloe, which, until recently, was considered a good pasture field, and one which has been stocked fairly heavily for years without receiving any fertiliser. It was remarked that it did not seem to be as good as it was some years ago, and the appearance of patches of sedge together with a result of .46% P_2O_5 on analysis of the herbage indicates very clearly that the field needs phosphates, and that the herbage thereon is not now fit to grow healthy stock.

The lowest figure obtained for P_2O_5 content of herbage (.14%) from any county visited during this survey was that in sample G. 35, taken from a heathery moor near the shores of Lough Corrib. Cattle here showed unthriftiness and depraved appetite while on this grazing, but were fortunate to have a change to reasonably good upland.

In Co. Galway, Aphosphorosis is prevalent over a wide area, showing up as unthriftiness in both young stock and milch cows. Sterility is common, and is no doubt due to the poverty of the grazing, especially in respect of phosphorus. Very little phosphatic fertilisers have been used for years, and in many areas the land is absolutely derelict. In the eastern area flooding from the rivers Shannon and Suck causes much loss of grazing area, and is a hindrance to the economic application of fertilisers. In the north of the county the trouble is most frequent on the "mountain" grazing where there is very little soil depth and where reclamation would be costly and in many cases almost impossible due to the large overlying masses of limestone. The need for good winter feeding is, however, much appreciated.

Local cures do not appear to be as widespread in Co. Galway as in the midland counties, but in the main it was generally remarked that improved winter feeding was the only cure.

Farmers seem to keep Herefords or Aberdeen-Angus cattle in preference to Shorthorns, as they claim that the latter are more susceptible to the disorder. Galloways are kept on some of the farms visited.

CO. ROSCOMMON

"Bog lame" and "Luanach" are the names given to Aphosphorosis in cattle in Co. Roscommon. It is not common to find really bad cases, and the disorder is mainly present in its milder forms. Sterility is very common in cows in recent years, especially on "callow" land and neglected upland.

Unthriftiness in cattle is quite common in that part of the county west of Athlone and along the west bank of the Shannon up to Lanesboro'. Scattered districts between Lanesboro' and Roscommon town are also affected.

In the district north of Ballinasloe between the Rivers Shannon and Suck, affected animals were observed on many farms. The greater portion of the land in this area is low-lying and moory. In the Ballydangan and Thomastown districts cases occur regularly. In general, the cattle of these districts are thin, with staring coats, long hooves, and creaking joints. In some cases it is looked upon as a normal occurrence when the cows become stiff and emaciated during the grazing season. On many farms in the districts referred to, the hay fed during the winter is of very poor quality. Milk yields are low, and, in recent years especially, some farmers have noticed that their cows have "gone back" very much in productivity. Very little, or, indeed in most cases, no manure has been applied to grassland in this district.

Some farmers in the Leecarrow district have observed certain abnormalities in their stock especially in dry seasons. Creaking joints, long hooves and depraved appetite are common symptoms. In this district, the greatest losses would seem to be those arising from low calf-crop and resulting low milk production. Temporary sterility is causing much alarm. In some cases the use of hormone injections has been tried without effect on farms where it is fairly obvious that inadequate nutrition especially in respect of phosphates is the main cause of sterility in the cows.

In the Kilrooskey district the disorder shows up mainly as unthriftiness in stock. It has been noted that very acute cases are not as common as they were ten years ago, and it is possible that better winter feeding is the explanation. Many of the pastures in this area would appear to be in dire need of phosphates. Sedges, weeds, and poor quality grass species constitute the bulk of the herbage.

In the north of the county some bad cases were met with in the Cortoonmore district near Ballaghadereen. Many of the pastures here are in a very poor condition.

The disorder is also known in the districts around Castlerea. Unthriftiness in stock on very neglected pasture land is very common. Poor drainage conditions are the cause of much trouble on many farms in this area.

In the moory lands west of Frenchpark, cases of "Luanach" have been experienced, and many unthrifty-looking animals were observed. Drainage is a big problem here also.

Results of analyses of herbage samples collected from pastures in Co. Roscommon are given in Table IV.

TABLE IV.

No.	Type of Pasture	% P_2O_5 in Herbage	% Crude Protein
R. 1	Upland	.38	11.9
R. 2	Moor	.29	10.3
R. 3	Upland	.66	17.2
R. 4	Moor	.27	11.3
R. 5	Upland	.46	14.7
R. 6	Semi-moor	.25	9.9
R. 7	Semi-moor	.30	10.2
R. 8	Moor	.46	—
R. 9	Upland	.57	17.1
R. 10	Semi-moor	.37	—
R. 11	Semi-moor	.34	—
R. 12	Upland	.44	—
R. 13	Semi-moor	.34	13.4
R. 14	Upland	.58	—
R. 15	Upland	.39	—
R. 16	Moor	.42	-
R. 17	Moor	.44	—
R. 18	Moor	.30	10.8
R. 19	Moor	.34	—
R. 20	Upland	.23	9.7
R. 21	Moor	.25	8.0

It will be noted that the P_2O_5 and protein content is very low in all samples except R. 3, R. 9, and R. 14.

Sample R. 3 is from a good upland pasture in the Athleague district; R. 9 is from "good" upland in the Kilrooskey district on which an occasional animal was beginning to show slight stiffness and creaking joints; and R. 14 is from another reasonably good farm in the same district where a certain degree of depraved appetite and slight stiffness were observed. Even on these three alleged good pastures the phosphate content is abnormally low. Sample R. 20 is from a farm in the Cortoonmore district of Ballaghadereen where some very badly affected animals were observed. The particularly low phosphate and low protein content of the herbage on this farm are significant.

In Co. Roscommon the disorder shows up more in the form of unthriftiness, which is fairly widespread. Very acute cases are not so common although some badly affected animals were met with. Temporary sterility in cows is one of the most serious effects of phosphorus deficiency in this county: at least it is the effect which is causing most alarm among stock owners. As in Co. Galway the importance of good winter feeding is fully realised in most districts, a fact which may explain the absence of very acute cases. The phosphate thus supplied to the stock in the form of winter fed concentrates is, however, not nearly sufficient to compensate for the serious deficiency

of phosphorus in so many of the pastures. In many areas bad drainage is a problem, and until such time as proper drainage is carried out the application of phosphatic manures to those parts will have very little effect.

CO. WESTMEATH.

This county is not so badly affected as the others surveyed. Some cases were, however, met with especially in the south of the county where the disorder is known as "pains" and "rheumatism."

In the Castledaly district near Moate, cases of Aphosphorosis in cows occur regularly, and every year one or two animals on most of the low-lying farms are affected. The usual symptoms are observed—bone chewing, crackling, and stiffness of the joints, staring coats and emaciation.

The disorder is well known in the Bruckanagh district near Glasson– a district in which most of the moory land is subject to Shannon floods. It is usual in this district to sell off even good milkers when symptoms of the disorder appear. Some farmers stated that they often lost cows from this disease, but now they do not keep them after the appearance of the early symptoms of "pains." The disorder was alleviated on some farms in this area by good feeding.

In the Ballinahown district, infertility, stiffness of gait, and low milk yields are symptoms mostly observed by farmers, and these symptoms are noticed in cattle grazing the moory and semi-moory pastures which are composed mainly of sedges and rushes.

Another area in the south of the county where Aphosphorosis symptoms are often observed is the Rahugh district near Kilbeggan.

In the north of the county the disorder is less well-known, and, except for a few mildly affected animals, most of the stock appeared to be in a fairly good condition.

On a few farms in the Collierstown district depraved appetite is common but no serious cases of Aphosphorosis have occurred in the district although most of the pastures appear to need plenty of phosphates. In this area most of the farms have upland as well as moory grazing and cattle are frequently changed during the grazing season.

Occasional isolated cases have occurred from time to time around Killucan, but conditions here appear to be reasonably satisfactory, although there is evidence that many of the pastures need manuring.

In a few low-lying farms in the Rochfortbridge area occasional animals have been affected, but in general the position does not appear to be serious.

In the Rathowen and Castlepollard districts the disorder is not common except for an occasional animal showing depraved appetite.

Relevant analytical data in respect of the samples collected in Westmeath are given in Table V.

TABLE V.

No.	Type of Pasture	Manurial Treatment (if any)	% P_2O_5 in Herbage	% Crude Protein in Herbage
W. 1	Moor	Untreated	.37	14.0
W. 2	Moor	,,	.45	14.7
W. 3	Moor	,,	.51	16.3
W. 4	Semi-moor	,,	.40	15.9
W. 5	Semi-moor	,,	.48	15.7
W. 6	Upland	,,	.44	14.5
W. 7	Semi-moor	,,	.44	14.7
W. 8	Semi-moor	,,	.50	16.3
W. 9	Moor	,,	.39	14.1
W. 10	Upland	,,	.37	13.3
W. 11	Semi-moor	,,	.34	—
W. 12	Upland	,,	.34	—
W. 15	Semi-moor	,,	.27	11.7
W. 17	Upland	,,	.44	—
W. 14	Good Upland ..	,,	1.05	18.1
W. 16	Upland	,,	.39	14.1
W. 13	Upland	8 cwt. Super/ac.	.69	17.3

Samples W. 13 and W. 16 are from the same field where animals previously developed symptoms of Aphosphorosis. W. 13 is from a portion of the field which received 8 cwts. Superphosphate per acre, and W. 16 is from the untreated (control) portion of the same field. There is a significant difference in respect of both phosphate (P_2O_5) and protein content, brought about by phosphatic manuring.

Sample W. 14 is taken from a field in the Ballinalack district, considered locally to be the best grazing in Westmeath.

The remainder of the samples are from fields where either pronounced or incipient Aphosphorosis occurred.

While there is definite evidence of Aphosphorosis in the south of the county, its incidence in the remainder of Westmeath is not widespread or pronounced.

There are no very large tracts of moory land and farms which have moory grazing usually have good upland also, and so change of pasture is available.

The portion of the county along the Shannon would seem to be the worst affected area.

Good winter feeding is practised on most of the farms, and this, together with sound upland grazing, would seem to be responsible for the comparatively low incidence of Aphosphorosis in Co. Westmeath, outside the portions mentioned above.

CO. MEATH.

Although animals suffering from Aphosphorosis were met with in this county, the disorder does not appear to be widespread. Except for an occasional isolated farm the stock in most areas appeared to be in good condition.

The disorder has been known on some farms in the Killaconaghan district, Ballivor, where there is both moory and upland grazing. The moory pastures consist mainly of sedges, with weeds like Scabious and Knapweed, and on the upland also small patches of sedge were beginning to make their appearance.

Cases were found on neglected upland pasture in the Agher district near Enfield where various losses have been experienced in the past fifteen years. The herbage here in the upland pastures is composed mainly of Crested dogstail and Yorkshire Fog, with the usual weeds like Plantains, Yellow Rattle, Knapweed and Selfheal.

Animals have been known to be affected also in the Derrindaly district near Trim, on semi-moory pasture. A few mildly affected animals were observed here. The disorder is known also in the extreme south of the county where it borders Offaly.

Table VI gives the results of analyses of the limited number of herbage samples collected. The county was not re-visited in the 1948 season.

TABLE VI.

No.	Type of Pasture	% P_2O_5 in Herbage	% Crude Protein in Herbage
M. 1	Moor	.46	14.0
M. 2	Semi-moor	.51	13.8
M. 3	Semi-moor	.57	14.5
M. 4	Good Upland	.86	17.0
M. 5	Moor	.52	15.2
M. 6	Semi-moor	.52	14.8
M. 7	Best in Meath	.89	20.1
M. 8	Upland	.58	16.6

From the figures in Table VI it would appear that even the moory and semi-moory pastures of Co. Meath, while low in phosphates, are not as deficient as similar pastures in other counties. In Co. Meath these pastures are somewhat drier than in other counties. Samples M. 4 and M. 7 were taken from good upland pastures in Meath for purposes of comparison with the poorer types of pasture.

CO. TIPPERARY (N.R.).

The extreme north of this county would appear to be the worst affected area, especially the district between Birr and Portumna. In this district, in the neighbourhood of Lorrha, the disorder is known as "Bockybone," and was common on farms which were not manured for years. Most farmers in this area realise the value of phosphatic manuring, but were unable to obtain supplies during the emergency.

There are some large stretches of moory land in this district where meat-and-bone meal was used as an effective cure by many farmers. Winter feeding on most of the farms consists of hay, straw, and roots.

The disappearance of the disorder on pastures recently manured has been noticed.

On a few farms in the Thurles area, unthriftiness and temporary sterility have been noticeable in recent years, and there is no doubt that many of the pastures need phosphates. The incidence of bad cases is not widespread —a fact which is due to a large extent to good feeding during the winter months.

In the Kilcommon district unthriftiness and temporary sterility, as well as depraved appetite are common in cows on many farms. From the type of vegetation observed there is every indication that dressings of both lime and phosphates are needed.

In the area between Roscrea and Templemore, occasional animals are found showing symptoms of Aphosphorosis. It is looked upon as a form of "rheumatism" and on some farms visited affected animals were being dosed with a substance which proved to contain a salicylate, which is specific for rheumatism.

In North Tipperary cases of paralysis, the symptoms of which were not identical with those of Aphosphorosis, were met with. Some similar cases were met with in Co. Kildare. The nature of this type of paralysis needs further investigation.

Table VII gives the relevant analytical data for the herbage samples collected in North Tipperary in 1947. The area was visited only in the first season of the investigation. All the samples were taken from fields on which animals had shown symptoms of disorder.

TABLE VII.

No.	Type of Pasture	Manurial Treatment (if any)	% P_2O_5 in Herbage	% Crude Protein in Herbage
T. 1	Upland	Untreated	.39	11.5
T. 2	Moor	,,	.48	14.7
T. 3	Upland	,,	.46	13.6
T. 4	Semi-moor	,,	.47	15.2
T. 7	Upland	,,	.49	15.9
T. 8	Upland	,,	.46	16.6
T. 11	Moor	,,	.23	9.8
T. 12	Moor	,,	.16	8.5
T. 5	Semi-moor	2 cwt. Super/ac.	.50	17.1
T. 6	Semi-moor	Untreated	.48	15.9
T. 9	Upland	,,	.46	15.5
T. 10	Upland	4 cwt. Semsol/ac.	.62	20.8

Samples T. 5 and T. 6 are from the same field, in which animals were observed to be unthrifty. Superphosphate was applied at the rate of 2 cwts. per acre on the portion from which sample T. 5 was taken. There was no appreciable improvement in the cattle even after applying superphosphate. It would appear that the application of 2 cwts. of superphosphate per acre was insufficient to raise the phosphate (P_2O_5) status of the herbage enough to prevent unthriftiness.

Samples T. 9 and T. 10 are from the same type of upland on a farm where the owner has eliminated Aphosphorosis in his stock with the application of 4 cwts. Semsol per acre. There is a significant increase in both phosphate (P_2O_5) and protein in the sample from the treated field (T. 10). Sample T. 9 was taken from a neighbouring field on the farm which was not manured.

In North Tipperary the disorder would appear to be more prevalent in the extreme northern portion of the county. Isolated cases occur throughout the county and much of the pastures need phosphatic manuring, but good winter feeding keeps the disorder in check. In some areas, however, unthriftiness and sterility due to phosphorous deficiency give rise to considerable economic losses to stock owners in this county.

CO. LONGFORD.

Aphosphorosis showing up as severe clinical symptoms in stock is not well known in Co. Longford. Some cases were met with, however, both on moory and neglected upland pastures.

The disorder is known as "Luanach" wherever it occurs but the incidence of acute cases would appear to be the exception rather than the rule. Much of the land is undoubtedly of very low fertility, and there are some considerable areas of cut-away bog. Most of the farmers realise that good winter feeding is essential to keep their cows from developing symptoms of disorder on certain pastures. The farms in general are small and there is generally a fair supply of new grass, which has the residual benefit of any manures applied while under tillage. This may be an explanation for the low incidence of severe cases of Aphosphorosis in the county. Change of pasture from moor to upland is available to animals on most of the farms, and in general, the stock are never confined to the same grazing throughout the season.

There is evidence of unthriftiness and depraved appetite among stock in the moory and semi-moory lands near Drumlish, and also in the Ballinamuck and Lanesboro' districts. Much of this moory land is in dire need of drainage.

Analytical data for the herbage samples collected are given in Table VIII.

TABLE VIII.

No.	Type of Pasture	% P_2O_5 in Herbage	% Crude Protein in Herbage
Ld. 1	Cut-away Bog	.26	10.3
Ld. 2	Upland	.47	—
Ld. 3	Moor	.35	
Ld. 4	Upland	.38	14.0
Ld. 5	Semi-moor	.28	—
Ld. 6	Upland	.38	
Ld. 7	Moor	.36	
Ld. 8	Moor	.29	10.2

It will be noted that the limited number of samples analysed are all deficient in "phosphoric acid" content. All these samples were taken from pastures on which grazing animals had shown symptoms of the disorder.

While cases of Aphosphorosis occur in Co. Longford, the occurrence of pronounced symptoms is not widespread.

The farms in general are small and nearly every field comes under the plough regularly. The result is that stock have access to fresh pastures where fertility, though not at a maximum, is much superior to that of the pasture lands which have never been broken. This keeps the stock in reasonably good condition, and even where cattle have to graze moory land of low fertility they are not confined to such pastures long enough for symptoms of Aphosphorosis to become apparent.

CO. SLIGO.

Only that portion of Sligo (roughly one-third of the county) contiguous to Roscommon and Leitrim was surveyed. Here, Aphosphorosis is known locally as "Crupagh," "Crippen," and "Crupawn." The disorder occurs on all types of land, and in the districts surveyed, would seem to be as common on dry upland as on the wet moory pastures.

The pastures in general are in a low state of fertility, and weeds like Yellow Rattle and Ox-eye-daisy, which generally indicate phosphate deficiency, predominate in almost all the upland pastures.

Unthriftiness and depraved appetite among stock are common, but the latter symptom is regarded more as a habit in individual animals than an indication of any mineral deficiency. Some farmers, however, did attribute this habit in their stock to "a want in the land."

On many farms where "Crupawn" used to be common among milch cows, farmers now sell off their cows as soon as they show any symptoms of disorder and replace them with cows in good condition. In some districts in the south of the county, farmers stated that they had to dispose of all their cows because of the development of "rheumatism," and buy in dry stock. Fairly mature Aberdeen–Angus bullocks appeared to be doing quite well on land where cows developed "rheumatism." During recent years sterility in cows has become very widespread in those parts of Sligo which were surveyed. One farmer, south-west of Ballymote, who keeps a premium bull, remarked that he has been keeping records of cows served since 1921 and that he never had fewer cows coming to the bull in the month of June than he had in 1948.

Cows showing slight symptoms of disorder were observed in the district north-west of Collooney, and also in the Riverstown area. The land here is very dry, but most of it has not received phosphates for years, a fact which is very well indicated in the poor quality, weedy pastures. Bone chewing, creaking joints, and slowness to come to the bull are common troubles in these districts. Hay and straw make up the winter ration on many farms.

In north Sligo, "Crippen" or "Crupawn" is known to many farmers, but the name is applied only to cows which show acute symptoms. As in the south of the county, depraved appetite is looked upon as a habit in certain cows, especially good milkers. Much of the soil is light and sandy, and pastures do not produce very much herbage. On these few farms where phosphates were applied, an improvement in both herbage and stock was apparent.

A small number of herbage samples were collected and the phosphate (P_2O_5) content determined. Relevant data are shown in Table IX.

TABLE IX.

No.	Type of Pasture	Manurial Treatment (if any)	% P_2O_5 in Herbage
S. 1	Upland	Untreated	.28
S. 2	Moor	,,	.30
S. 3	Upland	,,	.42
S. 4	Upland	,,	.38
S. 5	Upland	,,	.35
S. 6	Upland	4 cwts. Super per acre	.76

The herbage from the fields sampled, except in the case of S. 6, show a very low phosphate content. Samples S. 5 and S. 6 were taken from the same farm, portion of which was dressed with super phosphate, namely, that from which S. 6 was collected. The response to superphosphate application is very significant. Animals on this farm had shown symptoms of Aphosphorosis.

It was on this farm also that cobalt deficiency in sheep and young stock was diagnosed by Professor Sheehy (6), and successfully treated by drenching the affected animals with cobalt chloride solution.

The soil on this farm is very sandy, alkaline in reaction, and produced very scanty vegetation. On the superphosphate-treated plot a vast improvement both in the quality and the quantity of the herbage appeared. Clovers gave marked response to the fertiliser treatment. Many of the farms in this (Cloughboley) district need phosphates badly, and would no doubt respond equally as well as the one represented by Sample S. 6. In as far as Co. Sligo has been surveyed, there is much evidence of unthriftiness in stock due mainly to phosphorus-deficient pastures. Upland pastures appear to have a much lower status of fertility than similar pastures in other counties.

It would appear that very little interest is taken in "Crupawn" unless severe symptoms are developed in the animal, and when these symptoms appear the affected animal is disposed of. No local cures were heard of in any part of the county.

Winter-feeding is of poor quality, consisting in many districts mainly of hay from the phosphorus-deficient land. Most of the cattle kept are of the Aberdeen-Angus breed, with some Shorthorns. Farmers claim that the Aberdeen-Angus does not develop clinical symptoms to the same extent as the Shorthorn, and, in support of this, the black cattle met with in the county appeared to be in reasonably good condition.

CO. OFFALY.

Aphosphorosis has been very widespread in Co. Offaly, showing up both as unthriftiness in young stock and as severe clinical symptoms in milch cows. A detailed account of the conditions in Co. Offaly appears in the reports of Sheehy and O'Donovan already referred to (1), (2), and (3).

Further work in this county involved mainly the collection of herbage species from manured and control plots, the manurial trials being conducted by Mr. J. O'Donovan (Instructor in Agriculture).

On all the moory pastures in the midlands sedge appears to be the dominant plant species, with some Wild white clover very much stunted, occasional plants of Red clover, Birdsfoot trefoil, Plantanis, Selfheal, Yorkshire Fog and Crested dogstail. It was decided to take samples of plants from plots which had been treated with superphosphate and to compare them in respect of phosphate (P_2O_5) content with similar plants from untreated control plots. Results of analysis appear in Table X.

TABLE X.

Centre	No.	Plant Species	Manurial Treatment	% P_2O_5 in the Species
A	1	Wild White Clover ..	Untreated	.46
	2	Wild White Clover ..	6 cwt. Super/acre	.80
	3	Red Clover	Untreated	.30
	4	Red Clover	6 cwt. Super/acre	.55
	5	Birdsfoot Trefoil	Untreated	.32
	6	Birdsfoot Trefoil	6 cwt. Super/acre	.47
	7	Narrow leaved Plantain ..	Untreated	.30
	8	Narrow leaved Plantain ..	6 cwt. Super/acre	.55
	9	Selfheal	Untreated	.46
	10	Selfheal	6 cwt. Super/acre	.76
	11	Yorkshire Fog	Untreated	.37
	12	Yorkshire Fog	6 cwt. Super/acre	.65
	13	Crested dogstail	Untreated	.25
	14	Crested dogstail	6 cwt. Super/acre	.44
	15	Sedge	Untreated	.45
	16	Sedge	6 cwt. Super/acre	.60
B	17	Sedge	Untreated	.34
	18	Sedge	6 cwt. Super/acre	.43
A	19	Bulk Sample (all species)	Untreated	.41
	20	Bulk Sample (all species)	6 cwt. Super/acre	.72
B	21	Bulk Sample (all species)	Untreated	.32
	22	Bulk Sample (all species)	6 cwt. Super/acre	.61

At Centre A, from which samples 1 to 16 were taken, it was found difficult to collect sufficient sedge for analysis, as it appeared to have become

supressed by the other species. The disappearance of the sedge from manured plots had been observed by the Instructor at many centres, though this however was not evident to the same extent on all plots.

At Centre B, where the application of 6 cwts. superphosphate per acre failed to raise the phosphate content of the mixed herbage to the same level as that resulting from a similar application at Centre A, the sedge was still fairly dominant on the manured plot. In contrast, there was a complete change in the herbage as a result of manuring with superphosphate at Centre A. Both Wild white clover and Red clover became abundant, and the better grass species like Peremial Ryegrass and Meadow Fescue, which were formerly insignificant in the pasture, began to make their appearance all through the herbage. Sedge almost completely disappeared from the manured plot at Centre A.

From the figures in Table X it will be noted that, at Centre A the application of 6 cwts. superphosphate per acre increased the phosphate (P_2O_5) content of the clovers by 70% to 80%; Birdsfoot trefoil by about 50%; Plantain and Selfheal by 60-80%; Yorkshire Fog and Crested dogstail by about 75%. In the case of the sedge the increase was only 33% at Centre A, and 26% at Centre B. It was found difficult to collect samples of the individual species at Centre B.

A bulk sample of all species at Centre A gave a phosphate (P_2O_5) content of .72% (in the herbage of the manured plot) while a similar sample from Centre B gave a P_2O_5 content of .61%. It is very significant that the sedge remained fairly dominant at this Centre, and possibly the application of 6 cwt. of superphosphate was not sufficient to effect supression of this species here.

It would be interesting to find out the phosphate requirements of this sedge, which appears to thrive on phosphorus-deficient pastures (even on dry upland), and whether its disappearance from well-phosphated land is due to its inability to tolerate a high phosphate status in the soil, or to the fact that phosphates promote the spread of better species which eventually supress the sedge.

SUMMARY.

During the course of this investigation into the incidence of Aphosphorosis, ten counties have been visited.

The worst affected areas would appear to be the south midland counties of Laoighis, Kildare and Offaly. The disorder is fairly widespread in Galway, Roscommon, and the extreme northern portion of Tipperary. It is equally prevalent in that portion of Co. Sligo surveyed. The least affected of the

counties surveyed are Meath, Westmeath and Longford. In Longford, however, the lower incidence of Aphosphorosis is explained, not so much by a satisfactory phosphate status in the permanent pastures, but rather by the better treatment of the stock otherwise.

In general, the moory and semi-moory pastures are of very poor quality, consisting mainly of sedges and rushes, with weeds like Knapweed, Selfheal and Scabious. Cattle which are confined to this type of grazing show depraved appetites, creaking joints, bone abnormalities, long hooves, etc.—all symptoms of phosphorus deficiency. Temporary sterility is common and milk yields generally are low. Young stock remain stunted and unthrifty and their powers of disease resistance are considerably reduced. Similar conditions are found on neglected upland pastures.

On all pastures where Aphosphorosis is evident in the stock, the analysis of the herbage shows a low phosphate (P_2O_5) content, and in many samples where the phosphate content is low the protein content is also low. The application of phosphatic manures, in addition to raising the phosphate content, generally increases the protein content of the herbage also, and cattle show a marked preference for the manured portions of the grazing.

The loss resulting from the death of animals due to Aphosphorosis is slight in comparison with the high losses, which are never calculated, resulting from unthrifty stock, temporary sterility (which causes low calf-crop and low milk yields), and susceptibility to other diseases. These conditions are widespread but their significance does not appear to be realised. What are considered normal animals in many areas are very much below the standard of animals of the same age elsewhere.

Poor quality fodder collected from phosphate-deficient land, and shortage of other winter feeding contribute considerably to the incidence of Aphosphorosis. On many farms where cattle are confined to moory land it has been noticed that the better winter-fed animals are less likely to develop symptoms of the disorder in the grazing season.

Drainage is badly needed in many areas especially in the midlands, where, were it not for the flooding, farmers would more freely apply phosphates.

In order to improve areas in which Aphosphorosis is prevalent, the land must in many cases be drained, and in all cases phosphatic fertilisers must be applied. Experimental evidence shows that Aphosphorosis can be eliminated by supplementing the animals' diet with phosphates. In the interval, before the necessary pasture improvement is effected, it is accordingly essential that, in order to prevent Aphosphorosis, stock should receive a supplement of phosphate. This is available in the form of mineral mixtures rich in phosphates, and in the form of such foods as meat-and-bone meal and fish meal.

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AN ANALYTICAL COMPARISON OF IRISH AND AMERICAN TOBACCOS

By

V. D. Tyrrell, M.A., M.Sc., A.R.I.C., and T. S. Wheeler, D.Sc., Ph.D., F.R.C.Sc.I.

For many years efforts have been made in Ireland to produce tobacco which would compare in quality with imported material. Various aspects of the problem have been investigated, but no comparative analysis of Irish and foreign tobaccos has as yet been made. The present investigation has, accordingly, been undertaken to provide information of this type. Analytical figures (means of concurrent duplicates) have been obtained for the percentages in twelve samples of Irish tobacco of :—(*a*) sand and silica ; (*b*) ash at 450–500°, corrected for carbon, sand and silica ; (*c*) ash at 450–500° carbonated, corrected for carbon, sand and silica ; (*d*) CaO ; (*e*) MgO ; (*f*) K_2O ; (*g*) P_2O_5 ; (*h*) total chlorine ; (*i*) total sulphur (SO_3) ; (*j*) total nitrogen ; (*k*) nicotine ; (*l*) nornicotine ; (*m*) total alkaloids ; (*n*) ether extract.

The results of this work can be regarded as preliminary only, but they show that if sufficient data could be accumulated, it would become feasible to indicate methods likely to improve the quality of Irish tobacco.

EXPERIMENTAL DETAILS.

Samples.—Particulars of the samples which were supplied by the Department of Agriculture are shown in Table I. The authors are indebted to the Department for its assistance.

Methods of analyses. The choice of analytical methods was made after a search of the literature and after consultation with the Research Managers of Messrs. W. D. & H. O. Wills and of The Imperial Tobacco Co., Ltd. Use was also made of the methods recommended by the Association of Official Agricultural Chemists. (1)

Preparation of samples.—Sixty or more whole leaves from the bulk sample were selected and the laminae stripped from the midribs, dried in air overnight, separately ground in a steel mill to pass a 36 mesh sieve and mixed together. The resulting powder was stored in a tinned container out of contact with air. Three equal quantities were taken for each analysis, which was carried out in duplicate, one quantity being set aside for reference.

TABLE I.

Details of Tobacco Samples—1945 Crop.

Lab. No.	Dept. of Agric. Grade	Physical Characteristics			Soil Type	Crop Rotation	Manuring per Acre
		Texture	Body	Colour			
P. 1	Bright lug	Good	Light	Light yellow	Medium loam; non-calcareous.	Various manured crops.	10 cwts. tobacco mixture No. 1 *
P. 2	Semi-dark long leaf	Fair	Light	Dark yellow	Medium loam, calcareous.	Wheat '44; previously old meadow.	10 tons farmyard manure in drills. 6 cwts. emergency compound ‡
P. 3	Semi-bright leaf	Good	Light	Yellow	Medium sandy loam, non-calcareous.	Cereals '44; roots '43, cereals '42, tobacco '41.	20 tons farmyard manure ploughed in. 4 cwts emergency compound. 1½ cwts ammonium nitrate.†
P. 4	Dark leaf	Good	Heavy	Light brown	Medium loam, calcareous.	Wheat '44, meadow '43, wheat '42, beet '41	15 tons farmyard manure in drills 4 cwts. emergency compound 8 cwts. superphosphate, 35%
P. 5	Semi-bright leaf	Fair	Light	Yellow	Medium loam, calcareous	Wheat '44, previously old meadow.	15 tons farmyard manure in drills. 5 cwts. emergency compound.
P. 6	Semi-bright leaf	Good	Good	Yellow	Heavy clay loam, non-calcareous.	Tobacco in eight previous seasons	17 tons farmyard manure in drills. 4 cwts. emergency compound. 2 cwts. ammonium sulphate. 2 cwts superphosphate, 35%
G. 1	Bright leaf	Good	Light	Light yellow	Sandy loam, neutral reaction, non-calcareous.	Beet '44, potatoes '43, beet '42, potatoes '41	20 tons farmyard manure ploughed in. 3 cwts ammonium nitrate. 4 cwts emergency compound.
G. 2	Bright lug	Good	Good	Light yellow	Sandy loam, neutral reaction, non-calcareous.	Beet '44, potatoes '43; beet '42, potatoes '41.	20 tons farmyard manure ploughed in. 3 cwts. ammonium nitrate 4 cwts. emergency compound.
G. 3	Bright leaf	Fair	Light	Yellow	Sandy loam, non-calcareous	Wheat '44, beet '43; wheat '42; oats '41.	10 tons farmyard manure in drills. {P/K/N fertilizer. 4/2/4 cwts.
G. 4	Semi-bright leaf	Good	Good	Yellow	Sandy loam, non-calcareous.	Tobacco in five previous seasons.	12 tons farmyard manure in drills. 4 cwts emergency compound.
G. 5	Bright leaf	Fair	Medium	Yellow	Sandy loam, calcareous	Oats '44, barley '43, meadow '42 and '41.	20 tons farmyard manure in drills. 4 cwts. emergency compound. 2 cwts. ammonium sulphate. 2 cwts. superphosphate, 35%. 10 cwts. wood ashes.
G. 6	Semi-bright leaf	Good	Good	Yellow	Heavy clay; calcareous.	Wheat '44, potatoes '43; wheat '42, beet '41.	12 tons farmyard manure in drills. 6 cwts. emergency compound. 3 cwts. ammonium nitrate.

* Tobacco Mixture No. 1:—

Composition	Analysis
40 parts Sulphate of ammonia.	7.8% Nitrogen.
36 parts 35% Superphosphate.	12.5% Soluble phosphate.
24 parts Sulphate of potash.	11.6% Potash

‡ Emergency Compound:— Soluble phosphate 20%; citric soluble 2%; citric insoluble 2%; nitrogen 2.5%; potash 1%.

† The ammonium nitrate employed was diluted with gypsum and contained 15.5% nitrogen.

Moisture.—The sample (5 g.) was dried for 18 hours at 100° in a stainless steel pan. The percentage loss in weight so determined is conventionally regarded as the moisture content.

Ash at 450–500° (See (1) *12.5*).—The sample (10 g.) was ignited with a low gas flame in a vitreosil flat-bottomed dish on an asbestos mat, and when completely carbonized was ground with a flat-ended glass rod. Ignition was continued with frequent grinding until the ash was light grey in colour and carbon had almost disappeared (8 hrs.); the ashing process was completed in a muffle furnace at 450–500° in 30 minutes. The ash was weighed and the result recorded as percentage ash uncorrected for carbon, sand and silica.

Carbonation of ash.—The ash was treated with a solution (10 ml.) of ammonium carbonate (164 g.) in ammonium hydroxide solution (d. 0.88; 200 ml.) and distilled water (to 1,000 ml.) The mixture was evaporated to dryness at 100° and heated at that temperature for a further 24 hours. The residue was weighed and reported as percentage carbonated ash uncorrected for carbon, sand and silica.

Carbon. The ash was transferred to a beaker (600 ml.), mixed with concentrated hydrochloric acid (10 ml.) and the mixture boiled for two minutes. The liquid was evaporated at 100° and the residue treated with concentrated hydrochloric acid, which was removed on a steam-bath. The residue was kept at 100° for a further three hours to render silica insoluble, and then heated with concentrated hydrochloric acid (5 ml.) for two minutes. The mixture was diluted with water (50 ml.), heated at 100° for five minutes and filtered through a Gooch crucible into a 250 ml. graduated flask (Filtrate A). The acid insoluble residue was washed thoroughly with hot water until free from chlorion. The crucible and contents were dried at 100° to constant weight, ignited and reweighed. The loss in weight equals the weight of carbon present.

Sand and silica.—The residue is sand and silica which is corrected for loss in weight of the silica basin. The percentages of uncarbonated and carbonated ash are corrected for carbon, sand and silica.

Elements in leaf.—The methods used for the estimation of the elements in the leaf are shown in Table II.

Nicotine and nornicotine.—The alkaloids were determined by the method described by Bowen and Barthel (3) using the improved steam-distillation apparatus of these authors (3, p. 596).

Ether extract (crude).—A sample (5 g.) of the ground leaf was extracted for 16 hours with ether (130 ml.) in a Soxhlet apparatus (100 ml.). The solvent was evaporated from the previously weighed receiving flask which was again weighed after it had been kept at 100° for one hour. The result was expressed as percentage ether extract.

The following constituents were not estimated :—Na_2O ; Fe_2O_3 ; Al_2O_3 MnO. These normally amount to 0.5–1.0 per cent. on the dried leaf.

TABLE II.

Methods used for Estimation of Elements in Leaf.

Element	Quantity taken for Analysis	Method used
Ca and Mg ..	50 ml. of Filtrate A (see Determination of Carbon) which had been made up to 250 ml.	(1) *12*.12 and *12*.14.
K	50 ml. of Filtrate A	Mixed chlorides (KCl + NaCl obtained as described in (1) *12*.16. K estimated in mixed chlorides by method given in (10).
P	50 ml. of Filtrate A	(1) *12*.37b and *2*.9.
Total Cl ..	2.5 g. of ground leaf	(1) *12*.41 and *12*.42.
Total S ..	2.5 g. of ground leaf	(1) *12*.33 and *12*.34.
Total N ..	2.0 g. of ground leaf	(1) *2*.27 and *2*.34.

NOTES ON ANALYTICAL METHODS.

Moisture.—The Revenue Authorities regard the moisture content of tobacco as the loss in weight of the sample when dried at 212°F. No drying time is stipulated but experience has shown that after 18 hours further loss in weight is small and that period has been adopted as standard by some tobacco manufacturers. The moisture content as described is not, of course, the true moisture content since tobacco loses on heating, oils, resins, and other volatile constituents. A discussion of the problems included in the determination of moisture content is given in (4, 11, 12, 13).

Ash.—The percentage of ash obtained from tobacco depends on the temperature of ashing, particularly if the temperature exceeds 550°, as decomposition of salts to oxides then occurs ; accordingly, ashing is carried out at 450–500°. The Revenue Authorities require the ash content of snuff and offal snuff to be expressed as "carbonated ash," the carbonation process being intended to replace carbon dioxide lost during ignition. There are objections to this treatment ; for example, hydrogen carbonates are formed and these decompose only slowly at the drying temperature of 100°. However, carbonation has become a standard practice and when applied by experienced operators gives reasonably concurrent results.

Sand and silica.—As the sand and silica content of tobacco ash is mainly wind blown material, it is usual to deduct the sand and silica present to give a corrected value for ash content.

Calcium, magnesium, potassium, phosphorus, total chlorine, total sulphur, total nitrogen.—These constituents were, excepting potassium, estimated according to the A.O.A.C. methods.(1)* Owing to lack of anhydrous ethyl acetate and *n*-butanol of suitable quality, potassium was determined by the perchorate method as described in (10).

Nicotine and nornicotine.—Although much work has been carried out on the estimation of nicotine in tobacco, it is only recently that the rather common occurrence in the leaf of nornicotine has been recognized, (7). The method of estimation of both alkaloids published by Bowen and Barthel (3, cf. 8) has been used in the present work. The total steam volatile alkaloids are recovered by steam distillation from a strongly alkaline solution containing sodium chloride in excess. An aliquot of the distillate is treated with silicotungstic acid to precipitate nicotine and nornicotine. A second aliquot is treated with nitrous acid to form the non-volatile nitrosoamine of nornicotine, and nicotine is steam distilled from the solution after it has been made slightly alkaline. The weight of the nicotine silicotungstic ignition residue is deducted from the mixed alkaloid ignition residue to give that due to nornicotine. The total alkaloid content found in the present research has been used for comparison with the "nicotine" figures given in previous work.

Ether extract.- The material extracted from tobacco by organic solvents varies with the solvent used and with the operating conditions. In this research ethyl ether was used. The quality of the extract odour is, however, more important than the quantity.

DISCUSSION OF ANALYTICAL RESULTS.

The results of the analyses together with comparative figures for American tobacco are given in Table III. The immediate problem in discussing these results is to decide the type of American tobacco to be used as a standard. Irish tobacco is cured over coke whereas true fire-curing requires hard woods which yield a smoke which gives to the tobacco a characteristic flavour and aroma. Coke does not impart any such flavour or aroma and may produce undesirable effects if sulphur be present. The analyses given above are, therefore, not comparable with those obtained with true fire-cured tobacco but rather with American flue-cured pipe tobacco. This comparison is, however, not entirely satisfactory because, while no odour is imparted to the leaf during flue-curing, there remain undecomposed sugars which assist in the production of a satisfactory flavour but which tend to be decomposed by the coke-curing method used with Irish tobacco.

As will be seen from Tables III and IV, the figures for Irish tobacco are in general higher than the corresponding figures for the American material. Using the mean values for American tobacco as "universe means," it is found that for all but two constituents, there is a significant difference between the means for the two tobaccos.

* (See (6) in regard to the rapid estimation of calcium and (2, 5, 9) with reference to the use of selenium catalysts in the rapid estimation of nitrogen).

TABLE III.—Analysis of Irish Grown Tobacco—Whole Leaf—1945 Crop.

DRIED AT 212°F. FOR 18 HOURS.

MEAN OF DUPLICATES.—PERCENTAGES.

Sample Lab. No.	P1	P2	P3	P4	P5	P6	G1	G2	G3	G4	G5	G6	Limits for American flue-cured pipe tobacco		
													Min.	Max.	Mean
Sand and silica	1.0	0.6	0.4	1.2	0.5	0.4	0.8	1.2	0.9	1.2	1.0	0.7	—	—	—
Ash at 450/500° (corrected for carbon, sand and silica) ..	15.9	19.2	19.9	19.9	21.9	19.7	16.8	17.7	22.7	17.2	24.7	21.4	—	—	—
Ash at 450/500°, carbonated (corrected for carbon, sand and silica)	16.9	22.1	21.8	22.7	24.3	21.5	17.6	19.4	26.3	19.6	27.8	24.1	10.0	16.0	13.0
CaO	6.0	7.9	7.5	7.4	7.8	8.0	5.2	6.2	8.4	5.0	9.6	8.4	3.0	5.0	4.0
MgO	0.5	0.8	0.7	1.4	1.3	1.1	0.3	0.7	1.0	0.8	1.6	0.6	0.5	1.0	0.75
K_2O	2.9	3.5	3.2	3.2	4.0	2.5	3.9	3.7	3.5	3.8	2.8	2.9	3.0	5.0	4.0
CaO/K_2O	2.0	2.2	2.3	2.3	2.0	3.2	1.4	1.7	2.4	1.3	3.4	1.9	1.0	1.0	1.0
P_2O_5	0.6	0.5	0.5	0.4	0.3	0.4	0.5	0.9	0.5	0.7	0.3	0.5	0.5	1.0	0.75
Total chlorine	1.0	1.8	2.5	2.3	2.3	2.2	1.8	2.2	4.1	2.8	3.5	3.3	0.5	1.5	1.0
Total sulphur (SO_3)	1.1	2.7	2.4	1.7	2.7	1.5	1.9	2.1	2.9	3.6	2.7	2.8	1.0	2.0	1.5
Total nitrogen	2.1	3.9	2.4	5.0	3.4	2.6	2.5	2.5	2.5	4.4	3.8	3.8	1.0	2.5	1.75
Nicotine	0.6	2.8	4.0	3.7	5.0	4.1	2.3	2.2	3.5	3.6	6.0	4.6	—	—	—
Nornicotine	0.3	0.4	0.5	0.6	0.9	0.6	0.2	0.4	0.6	0.5	0.8	0.5	—	—	—
Total alkaloids ("nicotine") ..	0.9	3.2	4.5	4.3	5.9	4.7	2.5	2.6	4.1	4.1	6.8	5.1	2.5	4.0	3.25
Ether extract	5.4	4.8	5.9	3.8	5.9	6.0	5.9	5.7	4.6	4.7	6.3	5.2	5.0	7.0	6.0

TABLE IV.

Comparison of Irish and American Tobaccos.

Constituents	Irish Tobacco				American Tobacco	t for difference between Irish and American means	Probability (%) that difference between means is due to chance	Significance of difference between means
	Max. %	Min. %	Mean %	Std. Dev.	Mean %			
Carbonated ash, corrected ..	27.8	16.9	22.0	3.3	13.0	9.5	< 0.1	‡
CaO	9.6	5.0	7.3	1.4	4.0	8.3	< 0.1	‡
MgO	1.6	0.3	0.90	0.39	0.75	1.4	< 25 > 10	§
K_2O	4.0	2.5	3.3	0.48	4.0	5.1	< 0.1	‡
P_2O_5	0.9	0.3	0.5	0.17	0.75	5.1	< 0.1	‡
Total Cl	4.1	1.0	2.5	0.84	1.0	6.2	< 0.1	‡
Total S. (SO_3) ..	3.6	1.1	2.3	0.70	1.5	4.0	< 0.5 > 0.1	‡
Total N.	5.0	2.1	3.2	0.93	1.75	5.5	< 0.1	‡
Total alkaloids ..	6.8	0.9	4.1	1.6	3.25	1.9	< 10 > 5	*
Ether extract ..	6.3	3.8	5.4	0.75	6.0	2.8	< 2.5 > 1	†

(For formulae used see Davies, O. L., *Statistical Methods in Research and Production*, Oliver and Boyd (Edinburgh, 1947)).

‡ = Highly significant; † = Significant; * = Possibly significant; § = Not significant.

Sand and silica.—These constituents are present in small amounts. They are mainly due to wind-blown sand and are of importance only in regard to tobacco duty assessment.

Ash.—The Irish samples have a high ash content, only P. 1 and G. 1 give figures comparable with those from American tobacco. The results reflect the types of soil on which the samples were grown and indicate that generally those soils were too heavy for the cultivation of first quality semi-bright pipe tobacco. Such high ash contents reduce the combustibility of the leaf, a property which is known already to be poor in the majority of Irish tobacco crop grades. Samples P. 5, G. 3, G. 5 and G. 6 could be used commercially only by blending with much high grade American leaf.

CaO.—In line with the figures for ash content the CaO contents are also high, few results being near the range normal for American leaf. A consideration of the soil types on which the 1945 crop was grown suggests that excess of available calcium was in contact with the roots. The importance of soil type is indicated below (see Tables V and VI).

MgO.—The figures for MgO show appreciable variation but compare reasonably with those from American tobacco. Magnesium is essential for normal growth and the results show it was present in sufficient amounts in the soils on which the samples were grown.

K_2O.—The content of K_2O is best considered in relation to CaO. In a good tobacco ash the CaO and K_2O contents should be of the same order, whereas in the Irish tobacco ashes the CaO is always high. The K_2O contents are of the correct order, so that the soils had adequate potash contents. The correction of the incorrect CaO—K_2O ratios lies in removing the cause of excessive calcium assimilation.

P_2O_5.—The P_2O_5 figures compare favourably with those from American tobacco. The Irish leaf has evidently received adequate supplies of phosphate, a fertilizer essential to normal growth of the plant, especially in the early stages.

Total chlorine.—The chlorine contents of the samples are high. Such high figures, especially in association with high ash contents and lack of CaO/K_2O balance, must lead to poor combustibility. An appreciable amount of K_2O is present as potassium chloride instead of as potassium nitrate and salts of organic acids. The soils on which the samples were grown had evidently an excessive chloride content, possibly due to the use of potassium chloride in place of the sulphate or the nitrate as a potash fertilizer. The tobacco plant takes up chlorine readily, hence the necessity of avoiding potassium chloride as a fertilizer. It was ascertained that as a result of the last war, Irish tobacco growers were obliged to use the chloride in place of other salts of potassium.

Total sulphur (SO_3).—The SO_3 contents, in general, exceed the normal figures for American leaf. A certain amount of SO_3 is advantageous as regards flavour but excess seriously affects both combustibility and flavour. It is clear that the Irish soils had adequate supplies of sulphate.

Total nitrogen.—The variation in total nitrogen contents (2.1–5.0 per cent.) is wide compared with the limits for American tobacco ; on the whole the Irish figures are on the high side. A comparison of the total alkaloid and nitrogen contents shows that some of the samples have high protein nitrogen contents. This excess is apparent from the nitrogenous odour of the burning leaves. The high nitrogen content is possibly related to the excessive use of farmyard manure, particularly if placed in the drills. Such excessive use gives large yields of inferior tobacco. The main function of farmyard manure is to supply humus to the soil so that it may have a satisfactory moisture-holding capacity.

Nicotine and nornicotine.—The total alkaloidal contents are generally high when compared with the figures from American tobacco.

Ether extract.—The figures for ether extract compare favourably with those from American tobacco. This is unexpected in view of Irish climatic conditions. One would surmise that the absence of long warm periods would hinder the formation of resin in the leaf, and that the heavy rainfall would wash out appreciable amounts of the gums and resins produced. The presence of excess of protein nitrogen may be related to a high ether-soluble content.

The quality of the Irish leaf extract, which is more important than quantity, is poor. The odour produced on burning is unpleasant, unlike the aromatic odour given by American leaf. Apart from climatic effects the excessive amount of farmyard manure employed has probably contributed to the poor quality by providing too much protein nitrogen.

QUALITATIVE COMPARISON OF IRISH SAMPLES WITH AMERICAN TOBACCOS (TABLE V).

Table V shows on an arbitrary scale figures for the differences between Irish and American tobaccos in relation to ash, CaO, Cl, S and N. The differences obtained with MgO, K_2O and P_2O_5 are, as has been pointed out, of less importance. The figures for ether extract, while important, are excluded as they cannot be evaluated by chemical analysis. The scale of comparison is obtained by subtracting from the figures for an Irish tobacco, the upper limit for the same constituent in American tobacco. For example, the ash content (carbonated and corrected) of P. 1 is 16.9 per cent. and the upper ash limit for American tobacco is 16 per cent. so the figure for the difference is 0.9.

TABLE V.

Rating of Irish Tobacco Samples from Analytical Results.

(IN TERMS OF EXCESS OVER THE FIGURES NORMAL FOR AMERICAN TOBACCO)

Sample No.	Ash (carbonated and corrected)		CaO		Soil type	Cl Excess	S Excess	N Excess	Method of application of farmyard manure	Cl—S+N		All excess figures	
	Excess	Rating	Excess	Rating						Excess	Rating	Total	Rating
P1	0.9	1	1.0	3	N.C.	0.0	0.0	0.0	—	0.0	1	1.9	1
P2	6.1	7	2.9	8	C.	0.3	0.7	1.4	D	2.4	6	11.4	7
P3	5.8	6	2.5	6	N.C.	1.0	0.4	0.0	P	1.4	5	9.7	6
P4	6.7	8	2.4	5	C.	0.8	0.0	2.5	D	3.3	8	12.4	8
P5	8.3	10	2.8	7	C.	0.8	0.7	0.9	D	2.4	7	13.5	9
P6	5.5	5	3.0	9	N.C.	0.7	0.0	0.1	D	0.8	4	9.3	5
G1	1.6	2	0.2	2	N.C.	0.3	0.0	0.0	P	0.3	2	2.1	2
G2	3.4	3	1.2	4	N.C.	0.7	0.1	0.0	P	0.8	3	5.4	3
G3	10.3	11	3.4	11	N.C.	2.6	0.9	0.0	D	3.5	9	17.2	11
G4	3.6	4	0.0	1	N.C.	1.3	1.6	1.9	D	4.8	12	8.4	4
G5	11.8	12	4.6	12	C.	2.0	0.7	1.3	D	4.0	11	20.4	12
G6	8.1	9	3.4	10	C.	1.8	0.8	1.3	D	3.9	10	15.4	10

Key: C. = calcareous soil ; N.C. = non-calcareous soil ; D = farmyard manure applied in the drills ;
P. = farmyard manure ploughed in.

When the result for an Irish sample lies within the limits for American tobacco zero is entered in the Table. In no instance is a figure for an Irish tobacco in regard to a constituent considered in Table V, below the corresponding lower limit for American tobacco. It should be emphasized that the scale is arbitrary and that, for example, differences of say 1 per cent. between Irish and American tobaccos will have an effect on quality which will vary with the constituent considered ; further, the effect on quality will not be proportional to the excess involved.

Orders of quality obtained by this method are shown in Table V for ash, CaO, Cl + S + N, and for all the excess figures taken together. The relevant figures are summarized in Table VI, the samples being shown in the order obtained by adding all the excess figures.

TABLE VI.
Summary of Quality Orders of Irish Samples.

Sample No.	Ash	CaO	Cl + S + N	All excess figures	Soil type	Application of farmyard manure
P1	1	3	1	1	N.C.	—
G1	2	2	2	2	N.C.	P
G2	3	4	3	3	N.C.	P
G4	4	(1)	(12)	4	N.C.	D
P6	5	(9)	4	5	N.C.	D
P3	6	6	5	6	N.C.	P
P2	7	8	6	7	C.	D
P4	8	(5)	8	8	C.	D
P5	10	7	7	9	C.	D
G6	9	10	10	10	C.	D
G3	11	11	9	11	N.C.	D
G5	12	12	11	12	C.	D

(Key—See Table V).

It will be seen that the four orders of quality are similar ; anomalies are indicated by brackets. The best samples are those grown on non-calcareous soils ; this is to be expected, because calcareous soils tend to produce high ash and high CaO contents. Six samples (P1, P3, P6, G1, G2, and G3) had nitrogen contents within or close to the American tobacco limit. Of these, two (P6 and G3) had farmyard manure applied in drills, three had the manure ploughed in and one (P1) was not treated with this manure. All

other samples had the manure applied in drills, and showed excess nitrogen contents. There is an indication, therefore, that if farmyard manure be used, it should be ploughed in.

CONCLUSIONS FROM ANALYSES.

The conclusions, admittedly preliminary, which may be drawn from these analyses may be summarized thus :—

1. Irish tobacco has, compared with American tobacco, a high content in ash, CaO, Cl, S and N. These excess contents have a deleterious influence on its quality.

2. To reduce the ash and CaO contents tobacco should be grown on non-calcareous soils and the amount of calcium fertilizer applied should be controlled.

3. The use of farmyard manure should be restricted and if used, it should be ploughed in rather than placed in drills.

It is possible that best results in tobacco cultivation will be obtained by relating the addition of fertilizers to the analysis of the soil used. In order to do this efficiently it will be necessary to determine the effect of various types of fertilizer on the composition of the resulting tobacco. This will require the analysis of a large number of samples grown on analysed soils which had been treated with known fertilizers.

SUMMARY.

Analytical figures have been obtained for a number of constituents of Irish tobacco and the results have been compared with corresponding figures for American tobacco. Tentative conclusions have been drawn from the results.

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Research Laboratory,
Messrs. W. D. & H. O. Wills, Bristol.

Department of Chemistry,
University College, Dublin.

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MOVEMENTS OF SALMON IN THE SEA

FROM ACHILL, Co. MAYO (Preliminary Report for 1948).

By

Arthur E. J. Went, D. O'Driscoll and E. D. Toner

Fisheries Branch.

In a paper by one of us, published in 1947, the results of tagging a large number of salmon kelts in Irish rivers were given (Went, 1947). In all, over 22,000 fish were tagged and reports of the recapture of 527 clean fish were recorded. The proportion of re-captures was small—2.22 per cent. (3.24 per cent. for the females and 1.45 per cent. for males) and this may be explained in three ways. Many of the earlier tags were not entirely satisfactory. There was some evidence that they may have become loose and have dropped off the fish ; other tagged fish escaped notice and in any case the survival of the kelts is somewhat small. These three factors together account for the fairly low percentage recovery. Tagging experiments in both Norway (Dahl and Sommé) and Scotland (Menzies) have shown that extensive migrations are made by adult salmon in the sea before they return to the rivers. Details of some of these sea migrations around the Irish coasts can be seen from the results previously obtained in the north-west of Ireland (Fig. 1).

In addition to the data afforded by tagging, drift netting for salmon off the north coast of Ireland provides some interesting information. This drift net fishery, which is prosecuted somewhat offshore, relies almost entirely on grilse although an odd large fish does sometimes become entangled in the net. Generally speaking, to the west of Malin Head (see Fig. 2) the fish become meshed on the east or north side of the net. Eastwards of Malin Head, on the other hand, the fish generally become meshed on the western side of the net. These facts suggest that shoals of fish coming in from the open sea split up north of Malin Head, some passing westwards and the remainder eastwards somewhat on the lines indicated in Fig. 2. The previous tagging experiments show, however, that some fish do make a journey in the opposite direction along the Donegal coast (Fig. 1).

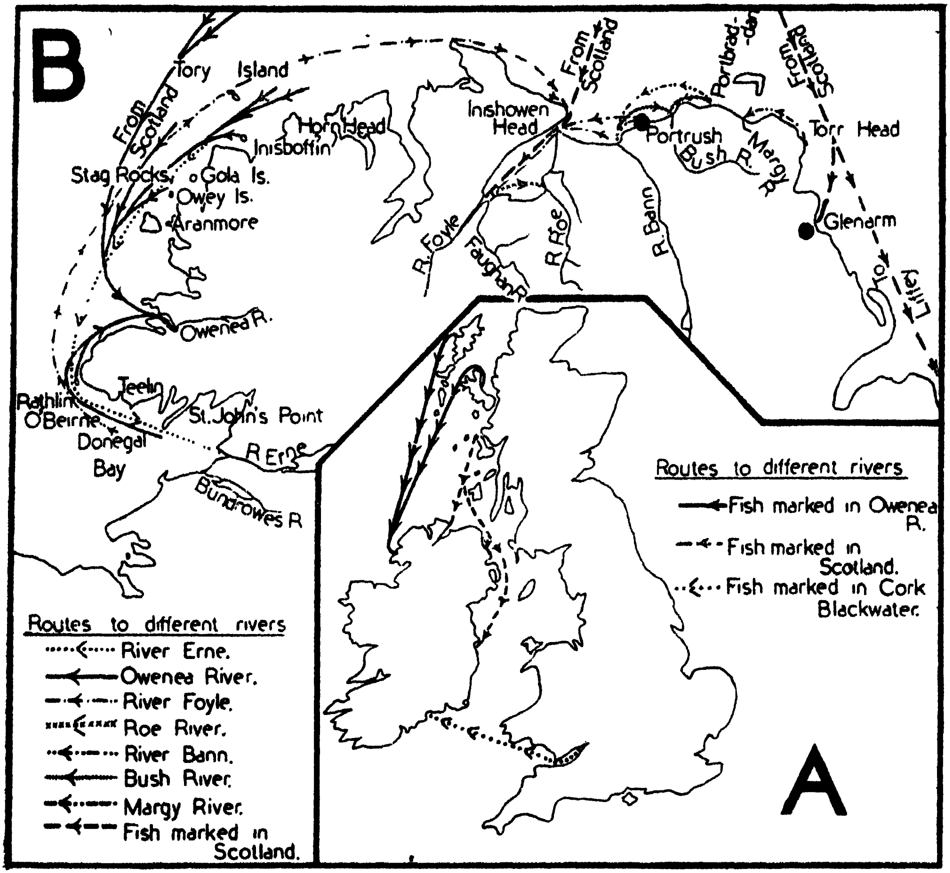

Fig. 1.
Migrations of tagged salmon (from Went, 1947, by permission of Royal Irish Academy.)

Further south along the north coast of County Mayo similar drift netting for salmon in the open sea is carried on but in this case the fish are, generally speaking, meshed on the eastern side of the net, suggesting a westward migration (Fig. 2). Still further south at Achill a certain amount of information is available from which at first sight one might be disposed to reach definite conclusions.

Achill, the largest island off the coast of Ireland, is situated between 9° 54″ and 10° 16″ west and 53° 51″ and 54° 1½″ north. Around the island in former days bag nets were operated for the capture of salmon at a number of places (see Fig. 3). Apart from the bag nets a number of draft nets are fished at Keem Bay, just east of Achill Head (Fig. 3). In recent years, however, only bag nets at Keel and Dooega and the draft nets at Keem Bay have been fished.

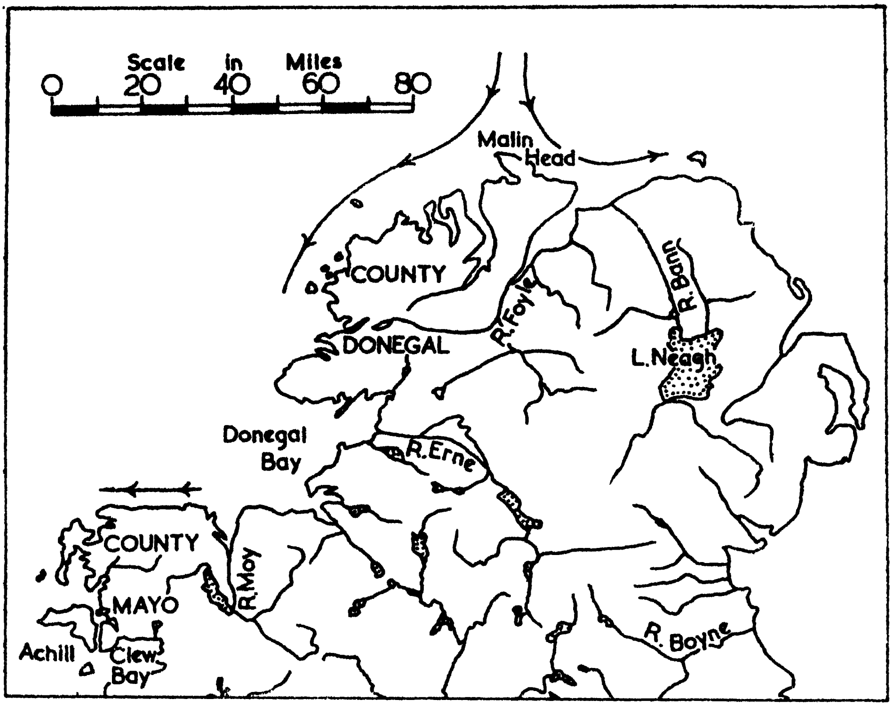

Fig. 2.
Sketch map of the northern portion of Ireland showing suggested migrations of salmon.

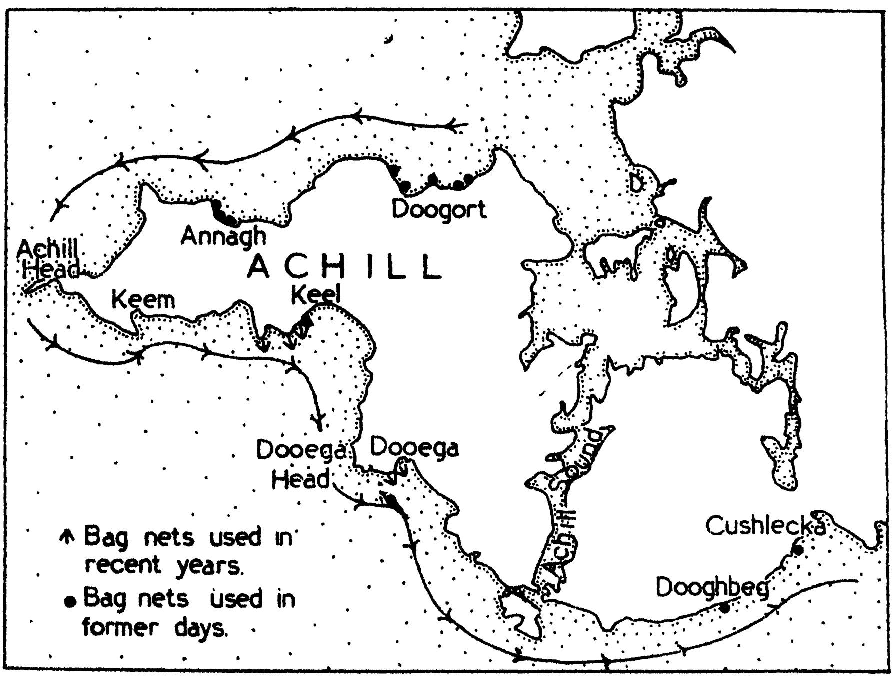

Fig. 3.
Sketch map of Achill showing sites of bag nets around the island.

The movements of salmon in this area have been the subject of much discussion by fishermen and non-fishermen alike. When the full number of bag nets was fished around the island the peak in the catches was first experienced at Dugort followed successively by big catches at Annagh, Keem Bay, Keel, Dooega and later at Dooghbeg and Cushlecka on the Curraun Peninsula. Many fishermen believe that these facts indicate an anti-clockwise movement of salmon around Achill somewhat on the lines shown by the hypothetical route indicated by the continuous line in Fig. 3. On the other hand when fish become meshed in the bag nets at both Keel and Dooega the great majority do so on the east side of the nets, suggesting that the fish were proceeding in the opposite direction. In confirmation of this, fish can be seen entering Keem Bay from the east, *i.e.*, they are proceeding in a westerly direction.

The Achill area was, therefore, chosen for the 1948 salmon-tagging experiments in the sea. As mentioned earlier, in recent years only six bag nets have been used at Achill, namely, four at Keel and two at Dooega (Fig. 3). In 1948 tagging experiments with the Lea Hydrostatic tag were carried on at these two places, a total of 117 fish being tagged (74 at Keel and 43 at Dooega) the fish having been captured in the bag nets. The Lea Hydrostatic

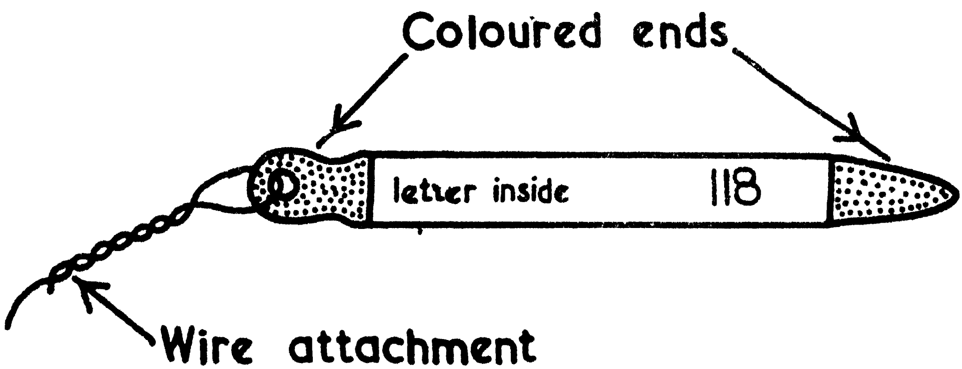

Fig. 4.
Lea's hydrostatic tag x 2.

tag, designed and manufactured by Mr. E. Lea of Oslo, Norway, consists of a tube of celluloid of suitable dimensions (Fig. 4) which contains a numbered letter as follows :—

> "Send this letter to Secretary, Department of Agriculture, Fisheries Branch, 3 Kildare Place, Dublin, with full particulars of fisherman's name and address, date and place of capture, gear used and weight and length (tip of snout to fork of tail) of the fish. Also enclose about 30 scales scraped from shoulder of fish just behind gill covers. A reward of 5/- will be given."

This tag was attached to the fish at the base of the dorsal fin by means of a length of stainless steel wire. From the outside the legend "*Cut ends. Letter inside. Reward.*" can be readily seen. The ends of the tag are coloured blue.

The dates of tagging at the two stations are given in Table I. (See Appendix for all tables). The tagging was carried out on the 12th to the 14th June by Messrs. Went, O'Driscoll and Toner; on the 19th to the 21st June by Messrs. O'Driscoll and Toner; on the 26th to the 28th June by Messrs. Went and O'Driscoll; and from the 3rd to the 5th July by Messrs. O'Driscoll and Toner. It might be mentioned here that during each week-end of these operations the bag nets were subjected to damage by the Basking Shark (*Cetorhinus maximus*), locally known as the Sun Fish.

The distribution of the length groups of the fish captured has been given in Table II. It will be noticed that most of the fish were grilse, very few of the larger fish having been captured. Weighing was dispensed with as this would have delayed the return of the fish to the sea. In Table III, giving the results of these tagging experiments, the weight given in the third column has been estimated on the basis of a condition coefficient of 1.1 on the scale adopted by Menzies (see Menzies 1921). (The condition coefficient (K) is determined from the formula $K = 10^5 W/L^3 \times 36$ where $W =$ weight in pounds and $L =$ length in inches).

Up to the 31st January, 1949, messages from thirty-one tags attached to fish and one unattached tag were returned to the office of the Fisheries Branch of the Department of Agriculture in Dublin. This was 27.3 per cent. of the fish tagged. There is reason to believe that one other tagged fish was captured in a draft net in the estuary of River Erne but the tag was not forthcoming.

Eleven fish were retaken and one unattached tag was found south of the place of tagging, whilst the remaining tagged fish were recaptured well north of the tagging stations. Excluding the fish (No. 99) found dead in the Carrownisky River on the 30th September, 1948, half of the fish recaptured were retaken within ten days of tagging (see Table IV).

Details of recaptures have been given in Table III. In the column giving the distance travelled, if the fish was captured in fresh water, only the distance from the point of tagging to the head of the tideway of the appropriate river has been given. The greatest distance travelled was one of 217 miles from Dooega to Carrigans on the River Foyle by the fish bearing tag No. 49. The most rapid journeys were made by two fish bearing tags Nos. 34 and 35 —112 miles in six days. The shortest routes to the place of recapture are indicated in Fig. 5.

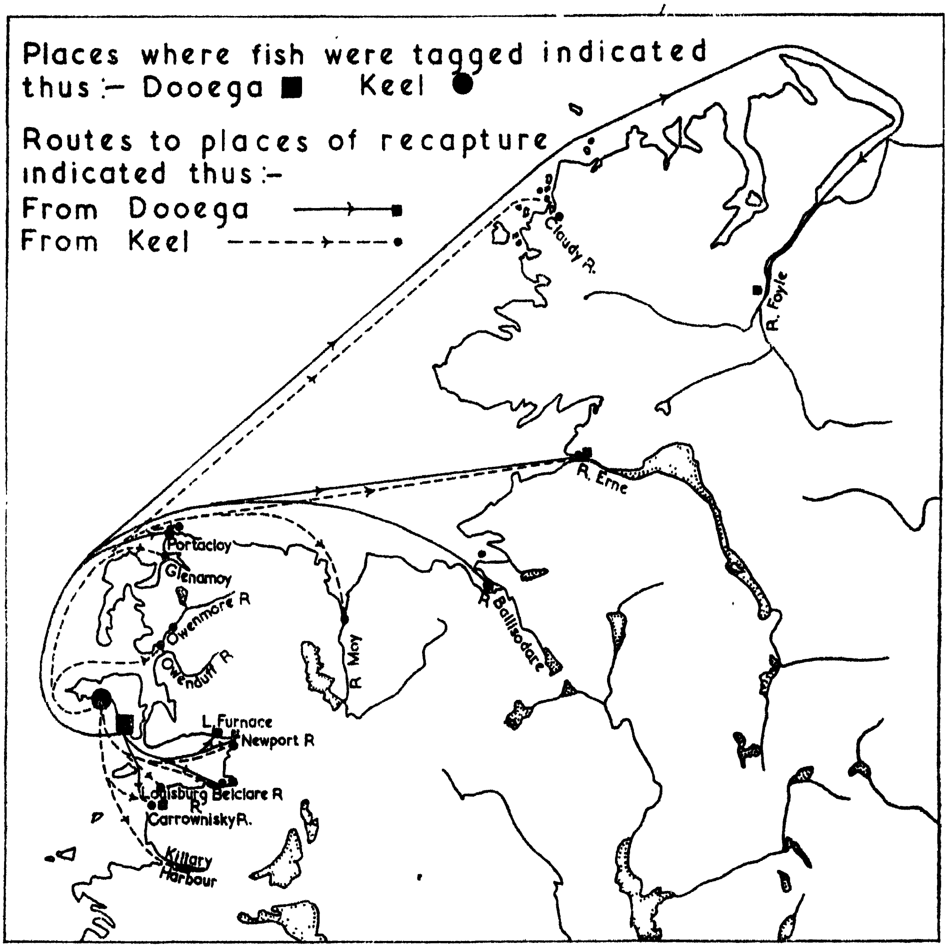

Fig. 5.

Sketch map showing shortest routes to places of recapture.

Three fish tagged at the same time at Dooega on the 19th June, Nos. 33, 34 and 35, were all recaptured in the River Erne. A fourth fish tagged at the same time was recaptured at Portacloy on the north coast of County Mayo, which might be regarded as *en route* to the same river. There is, therefore, some suggestion that fish from the same river may be shoaling together in the region of Achill, but the results at present are too limited to enable any definite conclusions to be drawn.

Of thirty-one recaptures of fish bearing tags, 22 (71 per cent.) were made in draft nets, 3 (10 per cent.) in drift nets, 5 (16 per cent.) by rod and line and 1 (3 per cent.) was found dead, having been killed by an otter.

The present tagging experiments reveal that the previous impressions of the movement of salmon along the northwest coasts of Ireland are, to some extent, inaccurate as it was generally assumed that fish moved from the north towards the south along the coasts. It is interesting to note that as regards fish No. 16, tagged on the 19th June at Keel and recaptured at Portacloy Bay in a drift net, the fishermen reported that this fish was recaptured on the western side of the net which is somewhat exceptional from that region. In other words this fish was making a migration which was in a contrary direction to normal in the area.

Sets of scales from twenty-six of the fish recaptured were forwarded to the Fisheries Branch. The age and group of these fish were determined from the scales and the results have been given in Table V. Excluding the single previous spawner, 3 (12 per cent.) of the recaptured fish were derived from one-year smolts and the remainder from two-year smolts. These results are quite in conformity with the results obtained previously from Irish salmon investigations (Went, 1947).

Although a number of spring fish were tagged not a single fish of this type was recaptured. The tag of one such fish (No. 88) was returned, having been found unattached on the shore of Clew Bay.

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APPENDIX.

TABLE I.

Details of dates and numbers of fish tagged.

Date	Place of Tagging		Total
	Dooega	Keel	
12/6	1	—	1
13/6	2*	8	10*
14/6	1	1	2
19/6	15	9*	24†
20/6	3	2	5
21/6	6	7	13
26/6	2	4	6
27/6	–	7	7
28/6	—	6	6
3/7	—	6	6
4/7	7	12	19
5/7	6	12	18
Total	43*	74*	117†

*Including one sea trout. †Including two sea trout.

TABLE II.

Details of size distribution of fish tagged (excluding sea trout)

Size in inches	No.	%	Size in cms.	No.	%
20.0–21.9 ..	2	1.7	55–59	29	25.2
22.0–23.9 ..	43	37.4	60–64	55	47.9
24.0–25.9 ..	48	41.8	65–69	19	16.5
26.0–27.9 ..	11	9.5	70–74	1	0.9
28.0–29.9 ..	1	0.9	75–79	3	2.6
30.0–31.9 ..	5	4.3	80–84	5	4.3
32.0–33.9 ..	3	2.6	85–89	2	1.7
34.0–35.9 ..	1	0.9	90-94	1	0.9
36.0–37.9 ..	1	0.9			
Total	115	100.0	Total	115	100.0

TABLE III.

Details of recapture of fish tagged in 1948.

	DETAILS OF LIBERATION						DETAILS OF RECAPTURE											
No.	Length		Estimated Weight*		Date and time of release	Where released	Length		Weight		Date	Place	Type of fishing gear used	Number at days at liberty	Distance Travelled		Speed per day	
	ins.	cms.	lb.	kg.			ins.	cms.	lb.	kg.					miles	km.	miles	km.
3	23.0	58	4.8	2.2	13/6/48 1.0 p.m.	Keel	23.0	58	5.1	2.3	22/6/48	Estuary River Moy	Draft net	9	78	125	8.6	13.8
11†	15.0	38	1.6	0.7	13/6/48 4.0 p.m.	Dooega	15.3	38	1.2	0.5	29/6/48	Lough Furnace	Draft net	16	23	37	1.5	2.4
13	23.5	59	5.1	2.3	14/6/48 6.0 a.m.	Dooega	23.0	58	5.0	2.3	18/6/48	Estuary Newport River	Draft Net	4	21	34	5.2	8.3
16	24.0	61	5.5	2.5	19/6/48 5.0 p.m.	Keel	24.0	61	5.5	2.5	22/6/48††	Portacloy Bay, Co. Mayo	Drift net	3°	44	71	14.5°°	23.6°°
18	22.5	57	4.5	2.0	19/6/48 5.0 p.m.	Keel	22.8	58	3.2	1.5	16/7/48	Estuary Belclare River	Draft net	27	25	40	0.9	1.4
19	23.5	60	5.1	2.3	19/6/48 5.0 p.m.	Keel	24.5	62	5.1	2.3	1/7/48	Killary Bay	Draft Net	12	30	48	2.5	4.0
21	25.5	65	6.6	3.0	19/6/48 5.0 p.m.	Keel	26.5	67	7.0	3.2	24/6/48	Estuary (Owenduff Ballycroy) River	Draft Net	5	24	38	4.8	7.7
24	25.0	64	6.2	2.8	19/6/48 8.15 p.m.	Dooega	—	—	5.5-6.5	2.5-3.0	5/7/48	Estuary Ballysodare River	Draft Net	16	96	156	6.0	9.6
28	25.0	64	6.2	2.8	19/6/48 8.15 p.m.	Dooega	26.0	66	6.0	2.7	5/8/48	Carrowniskey River	Rod and line	47	14	22	0.3	0.5
32	23.0	58	4.8	2.2	19/6/48 8.30 p.m.	Dooega	—	—	6.5	3.0	22/6/48	Annagh Head Westport	Draft net	3	20	32	6.7	10.7
33	25.0	64	6.2	2.8	19/6/48 8.30 p.m.	Dooega	26.8	69	6.0	2.7	22/7/48	River Erne Fishing Pool "The Well"	Rod and line	33	115	184	3.5	5.6
34	24.5	62	5.9	2.7	19/6/48 8.30 p.m.	Dooega	24.0	61	5.5	2.5	25/6/48	Estuary River Erne	Draft net	6	112	179	18.7	30.0
35	23.0	58	4.8	2.2	19/6/48 8.30 p.m.	Dooega	—	—	5.0?	2.3?	25/6/48	Estuary River Erne	Draft net	6	112	179	18.7	30.0
37	22.5	57	4.5	2.0	19/6/48 8.30 p.m.	Dooega	22.0	56	4.3	2.0	29/6/48	Portacloy Bay, Co. Mayo	Drift net	10	47	75	4.7	7.5
49	26.0	66	7.0	3.2	21/6/48 6.0 a.m.	Dooega	27.0	69	7.0	3.2	16/7/48	River Foyle at Culmagans	Draft Net	25	217	348	8.6	13.8
51	23.5	60	5.1	2.3	21/6/48 7.45 a.m.	Keel	25.0	64	5.0	2.3	2/7/48	Estuary River Moy	Draft net	11	78	125	7.0	11.2
56	22.0	56	4.2	1.9	21/6/48 7.45 a.m.	Keel	22.0	56	3.0	1.4	21/7/48	Louisburgh River	Rod and line	30	17	27	0.6	1.0
58	25.5	65	6.6	3.0	26/6/48 1.30 p.m.	Keel	25.3	64	6.3	2.9	8/7/48	Estuary Newport River	Draft net	12	25	40	2.1	3.4
60	24.0	61	5.5	2.5	26/6/48 1.30 p.m.	Keel	24.0	61	5.0	2.3	12/7/48	Carrowniskey River	Rod and line	16	18	39	1.1	1.8
73	25.5	65	6.6	3.0	28/6/48 7.30 p.m.	Keel	24.5	62	6.5	3.0	10/7/48	Estuary River Moy	Draft Net	12	78	125	6.5	10.4
88	37.0	96	20.0	9.1	4/7/48 6.15 p.m.	Keel	—	—	—	—	19/8/48	Clew Bay near Roonah Point	Tag only	—	—	—	—	—
91	23.5	60	5.1	2.3	3/7/48 6.0 p.m.	Keel	23.8	61	6.3	2.9	15/7/48	Estuary River Erne	Draft net	12	109	175	9.3	14.9
93	22.0	56	4.2	1.9	4/7/48 6.45 p.m.	Keel	23.0	58	4.4	2.0	7/7/48	Estuary Owenmore River	Draft net	3	27	43	9.0	14.7
95	24.5	62	5.9	2.7	4/7/48 6.45 p.m.	Keel	25.0	64	6.0	2.7	7/7/48	Combined estuary Owenduff and Owenmore Rivers	Draft net	3	22	35	7.3	11.7
97	22.5	57	4.5	2.0	4/7/48 6.45 p.m.	Keel	—	—	4.5-5.5	2.0-2.5	16/7/48	Clendy River	Rod and line	12	126	202	10.5	16.8
98	23.5	60	5.1	2.3	4/7/48 6.45 p.m.	Keel	24.5	62	5.4	2.5	6/7/48	Killary Harbour	Draft net	2	30	48	15.0	24.0
99	24.5	62	5.9	2.7	4/7/48 6.45 p.m.	Keel	26.0	66	7.8	3.5	30/9/48	Carrowniskey River	Killed by otter	88	18	39	0.2	20.3
106	23.5	60	5.1	2.3	5/7/48 6.30 a.m.	Dooega	26.0	66	5.6	2.5	20/7/48	Estuary Owenmore River	Draft net	15	29	46	1.9	3.0
108	26.5	67	7.4	3.4	5/7/48 8.0 a.m.	Keel	26.0	66	6.0	2.7	14/7/48	Estuary River Moy	Draft net	9	78	125	8.7	13.9
110	21.5	55	4.0	1.8	5/7/48 8.0 a.m.	Keel	22.3	57	4.1	1.9	9/7/48	Estuary Owenmore River	Draft net	4	27	43	6.8	10.9
114	23.0	58	4.8	2.2	5/7/48 8.30 a.m.	Keel	25.0	64	5.0	2.3	14/7/48	Broadhaven (Estuary of Glenamoy River)	Drift net	9	41	66	4.6	7.4
118	23.0	58	4.8	2.2	5/7/48 8.30 a.m.	Keel	24.0	61	5.5	2.5	8/7/48	Estuary Newport River	Draft net	3	25	40	8.3	13.3

*Weight estimated on a basis of K = 1.1 in Menzies formula $K = \frac{10^5 W}{L \times 36}$ where W = weight in lbs. and L = length in inches.

†Sea trout. °Maximum value. °°Minimum value.

††Some doubt about exact date, probably captured a day or so earlier.

TABLE IV.

Showing the number of days at liberty of the different fish recaptured.

	Number of days at liberty				
	1-10 days	11-20 days	21-30 days	31-40 days	41-50 days
Number ..	15	10	3	1	1
Percentage ..	50	33.3	10	3.3	3.3

NOTE.—This table does not include details of the fish found dead in the Carrownisky River on 19th August (No. 99).

TABLE V.

Age and growth as determined from the scales.

No.	Date of Recapture	Length ins.	Length cms.	Age Group (in winters)	Calculated Lengths: River 1st winter ins.	cms.	River 2nd winter ins.	cms.	River At migration ins.	cms.	Sea 1st winter ins.	cms.	Erosion of scales on Menzies Scale
				ONE YEAR SMOLT CLASS									
3	22/6/48	23.0	58	1+	2.8	7.0	—	—	4.2	10.5	17.5	44	0
91	15/7/48	23.5	60	,,	2.9	7.3	—	—	4.3	10.7	18.1	46	0
108	14/7/48	26.5	67	,,	3.3	8.3	—	—	6.2	15.7	21.0	53	0
				TWO YEAR SMOLT CLASS									
13	18/6/48	23.5	59	1+	1.8	4.5	3.8	9.6	4.7	11.7	18.8	48	0
16	22/6/48	24.0	61	,,	2.8	7.1	5.6	14.2	6.2	15.7	18.6	47	0
18	16/7/48	22.5	57	,,	2.1	5.3	4.7	11.7	4.7	11.7	18.4	47	0
19	1/7/48	23.5	60	,,	1.4	3.5	3.3	8.3	4.4	10.9	16.8	43	0
21	24/6/48	25.5	65	,,	1.7	4.3	4.2	10.5	5.3	13.5	20.6	52	0
28	5/8/48	25.0	64	,,	1.5	3.8	4.4	10.9	5.1	12.9	19.0	48	3
32	22/6/48	23.0	58	,,	2.6	6.6	5.0	12.7	5.6	14.2	18.8	48	0
33	22/7/48	25.0	64	,,	1.8	4.5	4.5	11.2	5.5	14.0	20.9	53	0
34	25/6/48	24.5	62	,,	1.8	4.5	5.1	12.9	5.9	14.7	18.7	47	0
37	29/6/48	22.5	57	,,	2.7	6.8	5.2	13.2	6.3	16.0	19.0	48	0
51	2/7/48	23.5	60	,,	1.1	2.7	4.1	10.2	4.1	10.2	18.1	46	0
56	21/7/48	22.0	56	,,	2.0	5.1	3.6	9.1	3.6	9.1	17.3	44	0
58	8/7/48	25.5	65	,,	1.8	4.5	4.5	11.2	5.8	14.7	20.5	52	0
60	12/7/48	24.0	61	,,	1.8	4.5	4.3	10.7	5.2	13.2	19.5	49	0
73	10/7/48	25.5	65	,,	2 0	5.1	4.4	10.9	5.6	14.2	20.7	52	0
93	7/7/48	22.0	56	,,	1.4	3.5	3.3	8.3	4.3	10.7	17.0	43	0
95	7/7/48	24.5	62	,,	2.0	5.1	4.5	11.2	5 3	13.5	20.1	51	0
98	6/7/48	23.5	60	,,	2.7	6.8	5.2	13.2	6.3	16.0	19.0	48	0
99	30/9/48	24.5	62	,,	1.6	4.0	4.4	10.9	5.1	12.9	18.6	47	3
106	20/7/48	23.5	60	,,	1.3	3.2	3.7	9.3	4.7	11.7	18 2	46	0
114	14/7/48	25.0	58	,,	2.8	7.1	6.5	16.5	6.5	16 5	19.9	51	0
118	8/7/48	23.0	58	,,	1.9	4.8	4.1	10.2	5.5	14.0	17.8	45	0
49	16/7/48	26.0	66	*With S.Ms.	—	—	—	—	—	—	—	—	0

*2.1+S.M.+

CONTAGIOUS ABORTION IN CATTLE

This is a highly contagious disease of very great economic concern to dairy farmers, resulting as it does in loss of calves, reduction of milk yield following abortion and in being often followed by difficulty in getting cows in calf. There are other forms of abortion but this is the most serious. There are also several other causes of difficulty in getting cows in calf.

CAUSE AND METHOD OF INFECTION.

The cause is a very minute germ which is passed out in enormous numbers by diseased cows with the slink or calf, the cleansing and the discharges. Cattle pick up this germ when consuming grass, fodder or drinking water contaminated by the discharges from the affected cow, by the cleansing or by the slink or calf. This is the principal way in which the disease is spread. The germs occasionally enter the body through the eye or other natural body openings and through the skin.

The bull does not usually act as a direct source of the disease at service, except on the rare occasions when his sex organs are infected. He may, however, transmit the disease indirectly by carrying the germs on his coat or by discharging them on to the pasture or fodder following service of an infected cow.

SYMPTOMS OF DISEASE.

Usually the only symptom shown by a cow is abortion, which generally occurs from the fourth to the eighth month of pregnancy. *It is most important to remember, however, that very many infected cows carry their calves to full time and apparently calve normally although the calf, cleansing and discharges may be teeming with the germs.*

DIAGNOSIS.

Every abortion, especially those occurring during the second half of pregnancy, should be suspected to have been caused by the abortion germ. Cows which retain the cleansing should also be suspected. To make certain, suspected animals should be blood-tested by a Veterinary Surgeon.

There is no Curative treatment for Contagious Abortion.

HYGIENIC PRECAUTIONS.

A cow about to abort should be put in a shed by herself and kept there for about three weeks after she aborts. If possible cows should not be allowed to calve in a shed in which there are other cows or heifers. When a cow has aborted the shed or the ground contaminated by the discharges, cleansing,

etc., should be well disinfected. It is a wise precaution to carry out similar disinfection after every cow calves. All calves born dead and all cleansings should be properly buried. If abortion breaks out in a herd very strict precautions should be taken to prevent it spreading from farm to farm.

CONTROL AND PREVENTION.

Method 1—*Blood Testing.* The aim in this method is to blood test all breeding stock including bulls and to dispose of those which do not pass the test. Only animals which pass the test should be added to a herd. Tested herds should be strictly isolated from other cattle. This is a difficult method which does not suit many farmers and before adopting it a farmer should go into all the details with his Veterinary Surgeon.

Method 2—*Vaccination.* This is the most practical and reliable method. All calves and heifers kept for breeding and all cows should be vaccinated with Strain 19 Vaccine which gives excellent results. Female cattle from four months old upwards can be vaccinated. Each farmer should make his own arrangements with his Veterinary Surgeon.

Neighbouring farmers should get together to have their cattle vaccinated so as to form a solid area in which all the cattle will be protected against the disease. This will guard against the chance of the disease spreading from farm to farm.

GENERAL REMARKS.

Contagious abortion is caused by a germ passed out by a diseased cow when she aborts or when she calves normally. There is no cure, but the disease can be prevented either by blood testing and getting rid of diseased animals or by vaccination. The hygienic precautions already referred to should, of course, always be taken.

THE USE AND PURCHASE OF FEEDING STUFFS

Feeding stuffs, *i.e.*, the foods used in the nutrition of farm stock, serve a number of functions. To begin with, every animal must have sufficient food to meet its daily requirements for maintenance purposes. In addition, according to the types of stock and the purpose for which they are kept, the requirements for growth, fattening, milk production, work, wool growth, and egg laying must be forthcoming. To complicate matters, two or more of these functions must frequently, if not usually, be provided for at the same time, as, for instance, in the case of the young growing fattening pig or the immature heifer producing milk.

Just as the current requirements of the various farm animals vary according to circumstances, so the nutritive value of foodstuffs varies, and it is on the degree of knowledge of both of these aspects of the nutrition of farm stock that the correct balancing of rations depends. The proper balancing of rations determines largely the profitableness of stock. The composition and digestibility of foodstuffs determine their nutritive value.

COMPOSITION.

The constituents of foodstuffs may be grouped as follows—

Proteins and non-protein nitrogenous substances.
Carbohydrates including:
  (*a*) the soluble group such as sugar and starch, and
  (*b*) the fibre.
Fats or oils.
Ash or mineral matter.
Vitamins.
Water.

Proteins comprise a large number of substances which differ slightly from each other, but are alike in containing about 16 per cent. nitrogen. They are essential in foods, being the only materials which supply nitrogen for the repair of waste tissue and for the formation of lean meat or muscle in the animal body; for this reason they are sometimes called flesh formers. They play an important part in the production of milk and eggs, and in growth. The proteins of animal origin are usually more valuable than the vegetable proteins, but the important point is to have a variety of proteins in the diet.

Certain non-protein nitrogenous substances, found in growing plant tissue rather than in seeds and fruits, while supplying the body with some of the constituents of body protein, are, for this purpose, only about half the value of food protein. It is because of the existence of proteins and of non-protein nitrogenous substances that the designation —protein equivalent —has been instituted. By protein equivalent is meant the sum of the digestible protein and of half the digestible non-protein nitrogenous substances.

Carbohydrates (starch, sugar, fibre, etc.).—These supply the animal with the energy for doing work, and they also maintain the heat of the body. When consumed in excess of what is required for these purposes, the surplus is utilised in the formation of fat, which is stored up in the body as reserve material. Starch and sugar are the most valuable forms of carbohydrates, and are easily digested by all farm animals. Fibre, which is present to considerable extent in hay and straw, but to a much smaller extent in roots and green succulent foods, varies in digestibility with the type, that of the young plant and of cereals and roots and tubers being more digestible than that of the mature plant. In general, the digestibility of feeding stuffs varies inversely with the fibre content. Some animals can, however, digest fibrous foods more easily than others. Ruminants and horses are capable of digesting foods of high fibre content such as hay and straw. Pigs and poultry, however, can utilise fibre—especially the coarse and liquified fibre—only to a limited extent and in their case fibre content is a factor which has a considerable influence on both the suitability and efficiency of a feeding stuff or diet. An excess of certain kinds of fibre is often responsible for serious digestive troubles of pigs and poultry. A certain proportion of fibre is, nevertheless, always useful in a diet, as it provides the bulk which assists in the passage of food through the intestines.

Oils or Fats.—These substances perform functions similar to those of the carbohydrates, the main difference being that one part of fat is equal to nearly 2.3 parts of carbohydrates for the production of heat. Fats and carbohydrates are capable of replacing each other to a certain extent, but neither can take the place of the proteins in the formation of muscle or other nitrogenous tissue, nor can they replace the proteins needed in the production of milk or eggs. Fats, carbohydrates and proteins are all utilised for the production, in the animal's body, of energy and body fat.

Ash or Mineral Matter.—When a foodstuff or an animal is burned it leaves a residue in the form of ash. Though it provides no energy, the mineral matter of foodstuffs is equally important with the proteins, carbohydrates, and fats in that it is required for the variety of vital live body processes as well as for the building of bone and for the formation of milk and eggs. For growth, milk and egg production a relatively large amount of mineral

matter is required. Foodstuffs contain not alone those minerals which, like calcium, phosphate, sodium and chlorine, are required in gross amounts but also such substances as cobalt, iodine, and copper which, though equally essential to the animal, are required only in the minutest quantity.

Good pasture and hay, or silage made therefrom, or from similar herbage growing on fully fertilised soil, contains all the essential minerals, but pasture herbage from land suffering from soil deficiency may be seriously deficient in phosphate, or iodine, or cobalt, or salt. Hay and grass silage may be similarly deficient. On the whole, however, pasture, hay, straw, and silage are good sources of minerals as are fish meal, and meat and bone meal. Milk must be specially mentioned as a rich source of all the mineral matter required by the animal both for growth and production. When a diet, not including milk, or fish, or meat and bone meal, consists to a large extent of concentrated foods, the addition of a mineral supplement of lime and salt is usually recommended. In the case of a deficiency of one or more inorganic substances in pasture herbage, the direct feeding of the deficient mineral or application of it to the land as a fertiliser is essential.

Vitamins.—The vital living processes of the bodies of farm stock continue in normal function only when quite a number of chemical activating agents are present. Into these chemical activations a group of constituents found in foodstuffs, and collectively called vitamins, enter. The vitamins are numerous and their functions are varied. In fact their functions are so diverse that in as far as this aspect of vitamins is concerned there is no common relationship. Actually the only point of similarity lies in the very small quantity of any of these food ingredients which is essential to the diet.

Outfed animals seldom suffer from vitamin deficiency because of the richness of pasture grass therein. Milk is another rich source. As foodstuffs are processed more and more the likelihood of vitamin deficiency becomes greater. Pigs and poultry kept under confined conditions may suffer from a deficiency of vitamins A, D, and the B complex group. Cows which calve in spring may have an insufficient intake of vitamin A during gestation. Vitamin C is not of importance in the food of farm animals, and foodstuffs usually contain an adequate quantity of vitamin E which has a special function in the promotion of the reproductive function and of milk production.

Water.—All foods contain water. Even the driest cake has about 7 per cent. of moisture, while white turnips may contain as much as 92 per cent. From the chemical point of view this water in plants has no more feeding value than ordinary water taken in the usual way. From other points of view, however, the water in succulent foods, such as grass and roots, has more value than an equivalent quantity of water taken in the usual manner.

DIGESTIBILITY.

If the chemical composition of foods were the only thing to be considered, it would be comparatively easy to arrive at their approximate values. The question is, however, much complicated by the fact that it is only that part of the food which is absorbed by the animal after digestion that really counts. Numerous experiments have been carried out with the object of determining the digestibility of the different food-constituents. The figures thus arrived at can only be regarded as averages, and must not be taken as absolutely correct for any particular sample of food. This is more especially the case with regard to hay and straw, which contain large proportions of fibre. Even the same food will vary in digestibility according to the class of animal to which it is fed. Cattle and sheep "chew the cud" and can digest hay and straw—which contain a large quantity of fibre—better than animals which do not ruminate.

When grass is cut early in the season, the hay made from it is much more easily digested than if the grass is allowed to stand till nearly ripe before cutting. Although more bulk, or even weight, may be obtained with late cutting, the total feeding value may be less.

Generally speaking, the younger the plant tissue the more digestible it is. Thus, the kind of grass which is regularly cut from a tennis court is more digestible than ordinary pasture grass as we know it in this country, but the latter is far more digestible than is grass which has reached the stage at which it is cut for hay. Potatoes and roots are as digestible as young grass: the various concentrated foods are slightly less digestible: the digestibility of hay and straw, particularly of the latter, is comparatively low.

Since the indigestible portion of food is voided by the animal in the faeces it is, of course, a valueless constituent of food. Accordingly the higher the digestibility the higher is rated the nutritive value.

MANURIAL RESIDUE.

That portion of a foodstuff which is voided in the faeces or dung contains a certain amount of fertiliser in the form of the unretained nitrogen, phosphate, potash, and lime. With the farmer who is in continuous possession of a holding this fact amounts to a postponement of the stage at which the benefit from the manurial residue of the foodstuff is reaped. For that reason the manurial value of a foodstuff has, in this country, seldom to be taken into consideration. Where farms change hands annually or at least very frequently the value of manurial residue of foodstuffs is a matter of

considerable significance. In that case allowance is made for the voidance, on the average, of two-fifths of the nitrogen and of three-quarters of the phosphates and potash fed.

COMPARABLE VALUES OF FOODSTUFFS.

Because the different constituents of foods serve different functions in the animal body it is difficult to make a comparison as between one food and another except in cases where the foods in question belong to the same category. It is true that digestible fat is, pound for pound, 2.3 times as valuable as digestible carbohydrate, both serving, within limits, the same purpose and capable of replacing one another to a very large degree. It is also true that any digestible protein which is not required as a source of nitrogen in the body, is metabolised like food fats and carbohydrates for the production of energy and fat formation for which purposes a pound of digestible protein is equivalent to a pound of digestible carbohydrate. Apart from this the proteins serve a purpose for which they cannot be replaced by the fats or carbohydrates. Nor can the functions of the minerals be taken up by any of the organic constituents of foods. Nor again can proteins, fat, carbohydrates or minerals serve the purpose in a dietary of any of the vitamins the individual functions of which, as already stated, vary as between one and another.

Apart from the very important and vital minerals and vitamins, a common denominator for the other dry matter constituents can be found in their energy value. This is the criterion of starch equivalent, barley or fodder unit, and total digestible nutrients.

FODDER (BARLEY) UNIT AND STARCH EQUIVALENT.

The fodder unit figures for foodstuffs are based on barley with which the other foods have been compared in large groups of animals for fattening purposes and for the production of work. The starch equivalent figures are determined on one or two animals in elaborate experimental plant. They are a calculated outcome of the actual amount of fat which, in the animal's body, each foodstuff is capable of producing. The following table gives the comparable value of a number of foodstuffs in terms of fodder (barley) units and starch equivalents as experimentally determined.

	Foods.	Fodder (barley) Units. *i.e.*, the number of units of other foods which have the same fattening or energy value as one unit of barley.	Starch Equivalents. *i.e.*, the number of pounds of starch which have the same fattening value as 100 lb. of the particular food referred to.
A.	barley	10	72
	wheat	10	72
	maize	9½	77
	rye	10	72
	oats	12	60
	wheat bran, 75% extraction ..	13	50
	,, ,, 85% extraction ..	14—15	44
	75% wheat pollard good ..	10	70
	,, ,, 2nd grade ..	12	55
	85% ,, ,, ...	12	55
	potatoes	40	18
	molasses	14	52
	mangels	100	6½
	swedes	90	7½
	turnips	120	5½
	carrots	80	9
	sugar beet	45	15
	sugar pulp	12	60
	wet grains	50	16
	rice bran	11	72
	whey	120	6
	hay—excellent quality	20	37
	,, —ordinary ,, ...	25	30
	,, —poor ,, ...	30	24
	,, —very poor ,, ...	40	20
	straw—oat—fresh quality ..	35	21
	straw—wheat and barley ..	45	16
B.	beans	10	70
	peas	10	70
	palmnut cake	10	73
	coconut cake	10	73
	dried brewers' grains	13	57
	malt combings	13	50
C.	fish meal	10	70
	meat meal	10	71
	meat and bone meal	10½	68
	earthnut cake or meal	9½	73
	ent. soya bean meal	10	70
	dec. cotton cake or meal ..	10	71
	dried yeast	10	70
	linseed cake	10	73
D.	milk—separated or skim or buttermilk	60	10
	green vetches	100	7½
	,, rape	100	7½
	marrow stem kale (leaves and stalk)	80	9
	cabbage	100	7
	green rye grass	60	12
	pasture—young	50	14
	pasture—advanced	60	12

The foodstuffs in Group A of the table are predominantly carbohydrate in composition and are of a type which can be compared directly with barley. Those in Group B are also largely carbohydrate but they contain from 50 to 100 per cent. more protein than the A Group. Group C includes foodstuffs which are high in protein, and are, because of their high protein content, used for the purpose of balancing up rations in respect of proteins. The foodstuffs in Group D contain all the nutrients which must necessarily enter into a complete diet. Each of these is balanced in itself, including adequate proteins, minerals and vitamins for all farm stock. Now the fodder (barley) unit figures and the starch equivalents set out in the table take into consideration only the energy value of each food, no credit being given, in as far as these two criteria of food values are concerned, to the special value of proteins or to the nutritive value of the minerals and vitamins. In the making up of rations for farm stock where, because of the variety of foodstuffs available from time to time, it is necessary to replace one by another, the use of the fodder (barley) unit or starch equivalent figures enables such replacement to be made without changing the total energy of the daily intake of food. Actually in this connection the fodder units are the simplest set of measurements to adopt.

PURCHASE AND SALE.

Similarly when foodstuffs are being purchased or sold either the fodder (barley) unit or starch equivalent is a reasonably safe criterion on which to rely so long as the energy value of the foodstuffs is the basis of comparison. Foodstuffs in Group C of the above table are seldom purchased on this score: they are sought because of their high protein content and, in the case of fish and meat meal, of their richness in minerals. Yet when purchased for energy or fattening purposes, as, for instance, when cakes are used for fattening older stock the figures for fodder (barley) units and starch equivalents apply.

To enable the different foodstuffs in Group C to be compared with one another accurately one would require to have information on the digestible protein, digestible fat, and digestible carbohydrate in each, and even then, because of the dissimilarity in function of protein and either fat or carbohydrate, the method of comparison could only be an empirical one. Indeed accuracy could only be reached after the mineral content of fish and meat meal is taken into consideration and the richness of yeast in the B Group of vitamins is recognised. Taking all these different aspects of nutritive value into consideration the conclusion is reached that the relative money value of the foodstuffs in Group C of the above table may, for practical feeding purposes, be set out in direct relationship to the protein content. An exception must be made to the case of linseed cake which has a special value in respect of its very beneficial physical effect on the food tube of farm animals.

Since the foodstuffs in Group B of the above table are in almost all cases used both as a source of energy and of protein, their money value must in some way bear a relationship to both energy and protein content. In comparison with some of the predominantly carbohydrate foods such as maize or barley they are first given a money value on the energy score using the fodder unit figures for the purpose. Thus, if maize sells at 22s. per cwt. the comparable money value of dried brewers' grains on the score of their nutritive energy is 10/13 of 22, or 17s. But the grains must be credited with some extra money value in respect of their higher protein—19 per cent. as compared with 10 per cent. in maize. The price difference between maize or barley and the high protein cakes such as cotton or earthnut is mainly a reflection of the difference in protein content. Suppose this price difference to be, on the average, x shillings per cwt. Now the fraction of x which must be added to 17s. to get a comparable money value for dried brewers' grains is represented by the excess of protein in dried grains over that in maize or barley, namely 9, divided by the excess of protein in the high protein cakes of Group C above, over that in maize or barley, namely 35, so that the money value of dried brewers' grains becomes 17s. plus 9/35 of x shillings. (The figure 45 is taken as the average percentage protein in the high protein cakes of Group C.) Now if maize sells at 22s. and the earthnut cake at 30s. per cwt., the value of the dried grains works out at 17 plus 9/35 of 8, *i.e.*, 19s. The extra money value, *i.e.*, in excess of energy value, to be credited to each of the foods in Group B above in virtue of their extra protein is as follows :—

beans	15/35	of	x	shillings	per	cwt.
peas	12/35	,,	,,	,,	,,	,,
palmnut cake ..	9/35	,,	,,	,,	,,	,,
coconut cake ..	11/35	,,	,,	,,	,,	,,
dried brewers' grains	9/35	,,	,,	,,	,,	,,
malt combings ..	14/35	,,	,,	,,	,,	,,

Thus, with maize at 22s., and earthnut cake at 30s. per cwt., the money value of beans works out 10/10 of 22 plus 15/35 of 8, *i.e.*, 25s. 5d., and of coconut cake at 25s. 2d.

NOTES ON FEEDING STUFFS.

The following notes are given regarding the suitability for different kinds of stock of a number of feeding stuffs :—

CAKES.

Feeding cakes, with the exception of compound cakes, are mainly by-products obtained in the process of extracting oil from different kinds of seeds and nuts. The feeding values of the different cakes depend in a large measure on the quality and purity of the seed used and the extent to which

the oil has been extracted. Owing to the fact that the quality may vary with the purity of the seed used and with the process of manufacture, cakes should always be purchased with a guarantee of purity and analysis. Most of the cakes on the market can now be obtained in the form of "nuts" or "cubes." Cakes in this form keep well, are convenient for use and are much less wasteful than when ground and used in the form of meal. Cakes should be stored in a dry, cool place: if the surroundings are damp, they become mouldy or rancid, deteriorate in value, and may actually be injurious if fed to stock.

Linseed Cake is the residue left after a considerable portion of the oil has been extracted from linseed or flax seed. A good cake should crumble down with pressure, and feel soft and oily to the touch. Linseed cake is specially suited to young stock, and for all animals that are low in condition, while it is highly valued for giving a good finish and fine touch to fattening cattle. Owing to its laxative nature, it is useful in counteracting the effects of other foods that have an opposite tendency. For the same reason, it is not a suitable food to be given in quantity to stock on young succulent pasture. Neither should it be fed liberally to cows in milk when the milk is intended for churning, as it tends to produce soft butter. It is sold in various forms—as cakes, nutted, and as meal. The best cakes are branded, but, when bought in the nutted or ground form, there is no means of tracing the identity of the brand. When meal is required for very young calves, it is better, if there be any doubt about the matter, to purchase a well-known brand of cake and have it ground, as there is some risk when meal is purchased as such, because of the fact that it may be made from a low class cake, deficient in oil, and containing ingredients which are unsuitable and dangerous for this class of stock.

Decorticated Cotton Cake is the residue of the cotton seed bean when the hard outer coating, or "husk," is removed from the seed before grinding and extracting the oil. Even the best cakes contain a small portion of "husk." When the husk is removed in an inefficient manner, the cake may contain a large quantity of it, and even a considerable quantity of cotton wool. A good cake should be soft in texture, of a bright yellow colour, and should contain very little cotton wool. The husks are sometimes ground to a fine powder and added to the cake. In this case their presence is more difficult to detect; but, if present in any considerable quantity, the cake will not possess the bright yellow colour so characteristic of the genuine, fresh article. Owing to the high percentage of protein it contains, decorticated cotton cake is of special value in improving a ration that is deficient in this constituent. When fed in conjunction with other concentrated foods, it is one of the best foods for fattening cattle; and it is also suitable for dairy stock as it improves the quality and texture of the butter. Cotton cake should not be fed to very young stock, or in large quantities to cows that are within a few months of calving.

Purchasers of cotton seed meal should in every case ask for the guaranteed analysis and should be guided in the selection of the meal they buy by its composition. The colour and appearance of the meal give no indication of its analysis.

Undecorticated Cotton Cake differs from decorticated cotton cake in not having the "husks" removed from the seed before extracting the oil. In purchasing this cake, care should be taken to see that the "husks" which it contains are not too rough or coarse, and that the cake does not contain an excessive quantity of them or of cotton wool. The husks contain a large quantity of fibre, and have most astringent properties. As a rule, cake made from Egyptian seed contains less fibre than that made from Indian or Bombay seed. Owing to its costive or binding action it has to be used with extreme caution, and is not suited for feeding to stock under one year old.

GROUND NUT PRODUCTS.

The residue remaining after the oil has been extracted from the nut, variously known as ground nut, earth nut or monkey nut, is used as cattle food in the forms of ground nut cake (decorticated and undecorticated) and ground nut meal. Nowadays the cake offered on the market is usually described simply as Earthnut cake, without any qualification. Therefore, in purchasing Earthnut cake, differences in the percentage of proteins and the content of husk should be taken into consideration.

Ground Nut or Earthnut Cake is the most popular of these products. It may be used as a substitute for decorticated cotton cake, which it closely resembles in composition. In experiments carried out by the Department, decorticated ground nut cake fed to fattening cattle gave as good results as decorticated cotton cake, whilst, for milk production, ground nut cake was somewhat superior. Cattle take readily to ground nut cake and it may be used to form 25 per cent. of the concentrates fed to dairy cows and fattening cattle. When stored in a dry place, ground nut cake will keep in good condition for several months.

Ground Nut Meal.—When the oil is chemically extracted from ground nuts, the residue, which is usually sold as ground nut meal, is naturally poor in oil. When steeped in water it is suitable for feeding to pigs and may be included to the extent of 10 per cent. of the meal ration.

PALM KERNEL PRODUCTS.

There are three important foods derived from the palm nut kernels, viz., palm nut cake, being the residue obtained after part of the oil has been extracted from the palm kernels by pressure, palm nut meal (more accurately,

palm nut, or palm kernel cake meal), prepared by merely grinding the cake, and palm nut meal, obtained direct from palm kernels after solvents have been used for extracting the oil.

The results of the Department's experiments with these foods have shown that palm nut cake and palm nut cake meal compare favourably with and can be used as a partial substitute for any of the following cakes—linseed, decorticated cotton, ground nut, and coconut. Although at times animals do not take readily to palm nut cake or meal, this difficulty is easily overcome by commencing with small quantities mixed with other foods. Palm nut cake may be fed to fattening cattle and dairy cows up to 4 pounds per head per day.

Palm nut meal has been found very suitable for calf feeding. When so used, the meal should be mixed with crushed oats and preferably fed dry after the animals have received their milk. The palm nut meal can, however, be mixed with the milk if desired. A small quantity (say ¼ lb. per head per day when the calves are 4 to 6 weeks old) should be given to commence with, and the allowance gradually increased as the calves become older. Both the cake and meal, mixed with other meals, may be used for pig feeding. It should not form more than one-third of the total quantity of food used when given to pigs. These foods should be prepared in the same way as ordinary pig foods. If steeped, they should not be allowed to remain for a long period before being used, otherwise the food becomes rancid and sour and the animals will not eat it.

Palm nut cake or meal should be stored in a dry place in view of its tendency to become rancid; for the same reason only small supplies should be purchased at a time.

Coconut Cake is the product of the coconut fruit kernel after this has been pressed for removal of the oil. This cake is very similar in composition to palm nut cake and may be used in the same way. Coconut cake is very suitable for dairy cows, but difficulty is sometimes experienced in getting the animals to eat it. It is found to improve the texture and keeping qualities of butter, especially in warm weather. Coconut cake is more difficult to store than palm nut cake, and is liable to become rancid unless carefully stored and used within a reasonable time.

FISH MEAL.

The best brands of fish meal, which should contain not less than 55 per cent. proteins or more than 5 per cent. of oil, are made from wholesome materials only, such as whole white fish, specially selected fresh fish offal, etc. By thorough steaming, removal of part of the oil, drying at a high

temperature and grinding, it is possible to prepare from such raw materials a palatable and nutritious food for stock. Unfortunately, however, considerable quantities of inferior fish meal, made from unsuitable fish offal and containing a high percentage of oil, were at one time imported into this country. Nowadays fish meal is usually a reliable feeding stuff.

MEAT MEAL OR MEAT AND BONE MEAL.

The meat meal or meat and bone meal on the market varies considerably in composition and more or less resembles that of fish meal, except that the protein content is slightly lower. It has about the same mineral content as fish meal, but is generally richer in fats or oils. Owing to its variable quality, care should be taken when purchasing it. Samples of good colour, dry, and free from noxious odour and fibrous material only should be used. Meat meal or meat and bone meal of good quality is an efficient substitute for fish meal, and may be fed to the extent of about one-tenth of the total ration of concentrates.

SEPARATED MILK.

The food value of separated milk is usually underestimated. It contains a comparatively high proportion of proteins and carbohydrates as well as a rich supply of mineral matter and of the B complex group of vitamins. Moreover, while the milk is fresh the food ingredients are almost completely digestible. As a source of proteins and as a supplement to cereals or other carbohydrate foods in the ration of calves, pigs, and laying poultry, separated milk or skim milk is incomparable.

BREWERS' AND DISTILLERS' PRODUCTS.

Several of the by-products from breweries and distilleries are useful feeding stuffs.

Dried Yeast contains a very high percentage of proteins. Its composition varies somewhat, but average samples contain from 45 to 50 per cent. of proteins, from 1 to 3 per cent. of oil, and from 30 to 35 per cent. of carbohydrates. Dried yeast is a brown flaky material with a pleasant smell and a somewhat bitter taste. In addition to its value as a fattening food, yeast is also very suitable for milk production.

Brewers' and Distillers' Grains are by-products from breweries and distilleries respectively. Distillers' grains have a slightly higher value than brewers' grains, and generally command a higher price. Grains may be obtained in either the wet or dry state. When they can be purchased within

carting distances, wet grains can be used with considerable advantage for dairy cows. They encourage the flow of milk, but when fed in large quantities, without a liberal allowance of concentrated foods in conjunction, they are apt to give the milk a poor bluish colour, and when first used may possibly tend to reduce the quality. Where grains are used in the wet state, care should be taken to see that they are fresh and that the troughs in which they are fed are kept thoroughly clean. Wet grains keep very well when suitably stored in a silo or pit and it is often convenient and profitable to fill a small silo during the summer with a quantity of wet grains for winter feeding.

For those living at a distance from breweries and distilleries grains are artificially dried to keep them sweet and to save railway freight.

Dried grains may form part of the rations for most classes of stock. Up to one-half of the total concentrated food given to milch cows, fattening and store cattle, may consist of dried grains, which may be mixed with such foods as ground oats, bran, pollard, etc., and fed dry. If no roots are used, however, or if these are given in small quantities only, the dried grains may be soaked before use and fed in wet condition.

For breeding sows and fattening of store pigs, one-quarter of the meals given may consist of dried grains. Grains should be fed sparingly, however, to young pigs before and immediately after weaning, and, for all pigs, they require to be well soaked before being fed. As much as one-third of the allowance of oats given to farm horses may be replaced by dried grains mixed with other foods and used dry. In the dry state, grains are very suitable for sheep, especially for ewes after lambing.

Malt Coombs are the dried sprouts which have been separated from malted barley. They are rich in proteins and contain a considerable portion of the nitrogen in the amide form. Malt coombs can be used as part of the foods for most farm stock and are specially suited for dairy cows, but they require to be well soaked with water before being used.

BEANS AND PEAS.

Beans are comparatively rich in proteins but deficient in oil. They are specially suited for cows in milk and can be used to replace an equal quantity of palm nut cake in the daily ration.

Peas resemble beans both as regards composition and feeding properties and can be used for the same purpose and in a similar manner.

BRAN AND POLLARD.

Bran is the outer coat or skin which is removed from wheat in the process of manufacture into flour. The colour of bran may be red or white, depending on whether red or white wheat is used. White bran is generally sold at a higher price than red bran, but neither its composition nor experience in using it indicates that it has a higher feeding value. The fact that white bran commands a higher price has led to the practice of bleaching red bran. The description "broad-leaved" bran simply means that the individual particles are of larger size than ordinary bran. There is no evidence to show that this broad leaved bran is more valuable than the common bran, or that it is worth the extra money usually paid for it. Not infrequently broad-leaved bran is produced simply by damping and rolling ordinary bran so as to enlarge the particles. Bran can be used as part of the food mixture for nearly all kinds of stock and it is especially useful as part of the ration for milch cows in winter, particularly, if wet grains or other succulent foods are not being used. The food for sows both immediately before and after farrowing may consist largely of bran. A small quantity mixed with oats for horses is also useful, especially for young colts.

The finer portions of milling offals are usually sold as pollard, sharps, thirds, or middlings. The latter normally contain a considerable proportion of flour, and are admirably adapted for poultry and pig feeding, more especially for young pigs after they have begun to take "solid" food. As in the case of bran, the colour of the pollard depends largely upon the kind of wheat used. Two kinds of pollard are usually on the market, "white pollard" and "red pollard". The former usually sells at a higher rate than the latter, but the quality of pollards depends solely upon their composition, and there is no evidence to show that "white pollard" is more valuable than "red pollard" or that it is worth the extra price per ton usually demanded for it.

The quality of wheat offals, *i.e.*, bran and pollard, is related to the degree to which wheat is extracted in the preparation of flour for bread making. Offals remaining from the 85 per cent. extraction contain more fibre than those resulting from the pre-war 75 per cent. extraction process, and their nutritive value is accordingly reduced. Because of the greater proportion of the exterior layers of the grain which is included in the flour from the 85 per cent. extraction the greater part of the B complex group of vitamins, which, pre-war, went off in offals, passes nowadays, in the milling of 85 per cent. extraction flour, into the flour. For this second reason wheat offals from the high (85 per cent.) extraction have a lower nutritive value for pigs and poultry than those from the lower (75 per cent.) extraction process.

CEREAL GRAINS.

The principal cereals used in this country are wheat, oats, barley and maize. As foodstuffs these grains resemble each other in being specially rich in carbohydrates, chiefly in the form of starch.

Wheat of good quality is too expensive as a rule to use for feeding purposes. Grain unsuitable for milling can be ground into meal and used as part of the ration for pigs, dairy cows, fattening cattle, and young stock generally. Ground wheat is a useful food for young pigs, especially when separated milk is not available. Small whole wheat is particularly useful for poultry feeding.

Barley of good malting quality normally commands a price which, having regard to the price of other foods, renders its use for feeding purposes uneconomical. Its high carbohydrate and low fibre contents make it a very valuable fattening food equivalent to maize, especially for pig feeding. Nowadays a number of high yielding non-malting types which are resistant to lodging are available. (See Department's Leaflet No. 102--The Use of Home-grown Grain in the Feeding of Farm Animals.)

Oats, when crushed or ground, can be fed to all classes of stock on the farm. There is nothing to equal oats as food for horses. When used with decorticated cotton cake or earthnut cake in the proportion of three of oats to one of cake, oats make a first-class concentrated food for dairy cows. Along with linseed cake, in the same proportions as above, oats are an excellent food for weanling calves. Oats alone, fed in conjunction with separated milk or skim milk, have been found to be a satisfactory food for calves. Finely ground oats to the extent of about half of the meals ration may be used for fattening pigs and there is evidence that even a higher proportion may be used, particularly during the later stages of fattening.

Maize, like wheat and barley, is essentially a starchy food and requires to be used in conjunction with foods rich in proteins. It is especially suited for fattening pigs, and may also form a considerable portion of the concentrated food for fattening cattle and for young stock.

MAIZE GERM MEAL.

Maize germ meal is a by-product of the manufacture of starch from maize. It can be used in much the same way as maize meal. It should be used only in moderate quantities for cows in milk or fattening pigs, as it is apt to impart a disagreeable flavour to the milk and pork.

CALF MEALS.

A special warning is necessary regarding the use of inferior calf meals. Farmers should not be misled by the statement that costly ingredients are used in the manufacture of these meals, and that these ingredients possess a special value in preventing scour and keeping calves otherwise healthy. If calves are healthy there is no necessity to give them costly drugs and if there is anything the matter with a calf it should get special treatment. Particulars regarding calf meals will be found in the Department's Leaflet No. 20—"Calf Rearing."

POTATOES.

Potatoes are essentially a starchy food. They are fed in the raw condition to cattle and in the cooked form to pigs and poultry. Owing to their tendency, if abruptly introduced, to cause stomach troubles in cattle, they should be fed with caution, and cattle should be gradually accustomed to their use. One of the best ways to dispose of refuse potatoes is to feed them to pigs or poultry. The question as to whether marketable potatoes should be fed to pigs depends on the current price of maize-meal and barley. One pound of either of these foods is practically equal to four pounds of potatoes for pig feeding. The best method of preserving potatoes for feeding to farm stock is to ensile them.

HAY AND OAT STRAW.

There is a great difference between the best and worst samples of hay, both as regards composition and digestibility, so that the actual analysis of any particular lot may either rise far above or fall far below the average. The quality will vary according to the soil, system of manuring, season, herbage on the meadow, time of cutting and weather conditions during hay-making. The quality of oat straw will also depend on soil, season, variety, time of cutting, and weather during the harvest. Straw has a higher feeding value when cut before it is fully ripe. Hay, straw, and other bulky foods of a similar nature cannot be valued or compared with concentrated foods on the basis of analysis. They supply the bulk which, in the case of ruminants, is necessary to keep the animals in a healthy condition.

ROOTS.

Mangels, swedes, yellow and white turnips, carrots and cabbages, all contain a large quantity of water which may reach 92 per cent. in the case of white turnips. The principal solid constituent is carbohydrate. The composition of the roots varies according to soil, season, manurial treatment and size. The question as to whether the water in roots has a special feeding value has already been referred to. Mangels require to "mature" after

harvesting, and should not, as a rule, be used till about the new year. Swedes and turnips may impart a "turnipy" flavour to butter and should be fed sparingly to milking cows, especially where butter is made and the cream or milk is not pasteurised before churning. Carrots are specially suited for horses. Cabbages make first-rate feeding for cows in autumn or for fattening sheep or lambs. Kales and Catch Crops provide valuable green fodder for cows.

SUGAR BEET BY-PRODUCTS.

Sugar Beet Tops and Crowns.—These are best fed to cattle and sheep after a couple of weeks wilting or alternatively they may be ensiled. Small quantities should be fed at first, particularly in frosty weather, and the tops and crowns should be as free from earth as possible.

Dried Pulp and Sugar Pulp.—Dried pulp is prepared by artificially drying wet pulp as it comes from the sugar factory until it contains about 88 per cent. of dry matter. In this condition it is easily handled and can be stored with safety for a long period. Sugar pulp or molassed pulp, which is the form in which the food is marketed in this country, is obtained by adding molasses (treacle) to wet pulp and artificially drying the mixture to about the same degree of dryness as dried pulp. Dried pulp and sugar pulp are somewhat similar in feeding value but the latter is more palatable. Both foods may be fed in a dry or wet condition. When fed in the wet condition the pulp should be steeped in water beforehand for some 10 to 12 hours. Dried pulp and sugar pulp are specially suited for dairy cows, fattening cattle and sheep, and may be used to a limited extent in the feeding of breeding sows and store pigs.

In experiments conducted by the Department with fattening cattle it was found that when sugar pulp replaced two-thirds of the maize-meal and crushed oats in the ration, the result was that, although the daily gain was not reduced, the animals did not acquire the "bloom" of well-finished cattle. Consequently it is desirable, when using a ration containing a large proportion of sugar pulp for fattening, to add to the ration each day during the last month of the fattening period a few pounds of good linseed cake.

In experiments with fattening pigs conducted by the Department, pulp has not, mainly on account of its bulky nature, given satisfactory results when fed to the extent of more than one-sixth of the total meal ration.

Further particulars regarding the feeding of sugar pulp and dried pulp will be found in the Department's Leaflet No. 1—"The Cultivation of Sugar Beet."

SILAGE.

Silage is the name given to grass or other fodder crops that have been preserved in a green state in silos or suitably constructed stacks. Its feeding value varies according to the crops used for the purpose, and depends largely on the success attending the ensiling of the materials used. Well-made grass silage in good condition is an excellent winter food for all classes of cattle, being specially suitable for milch cows. See the Department's Leaflet No. 105.

ARTIFICIALLY DRIED GRASS AND GRASS MEAL.

The nutritive value of young grass is best preserved by artificial drying. This gives a product which, when baled, can be stored conveniently, and is an excellent, if expensive, food for cows, calves, foals and other farm animals. When ground the product is a green meal which makes a valuable addition to the diet of pigs and poultry and is also suitable for other stock. Artificially dried grass and grass meal are rich in carotene, protein, the B complex group of vitamins and valuable minerals.

MOLASSES.

Molasses or treacle is a by-product of the sugar industry composed of carbohydrate in the form of sugar, and water. It may be added either to dry fodder or to meals for stock feeding. It is slightly laxative, particularly the molasses from the beet sugar industry.

CONDIMENTS AND APPETISERS.

Various preparations containing spices or other aromatic materials are from time to time offered for sale, and are recommended by the vendors for calves, pigs, poultry and other farm stock. Most of these substances are proprietary articles, and are sold under ostentatious names to attract buyers and at prices far in excess of their feeding value. Pamphlets of a misleading character describing the curative and growth stimulating properties of these preparations are widely circulated amongst prospective buyers. If calves and pigs are given suitable rations which can be made up for the most part from the ordinary home-produced foods available on the farm, there is no necessity to use, in addition, condiments or appetisers of any description. If a calf or pig is not thriving, it will in most cases be found that the food given is unsuitable. Instead of purchasing a high priced condiment, the defect in feeding should be discovered and rectified. If the animal is diseased, a condiment will not cure it. The cause of the disease should be ascertained, and proper remedial measures taken for its treatment.

TABLE showing the total food ingredients and the digestible portion of the principal feeding stuffs. Great variation occurs in the composition of any particular food, but the following data have been compiled mainly from the revised table originally prepared by Professor Crowther.

NAME OF FEEDING STUFF	TOTAL PERCENTAGE IN FOODS				DIGESTIBLE PERCENTAGE IN FOODS		
	Proteins, Amides, &c	Oil	Soluble Carbo-hydrates	Crude Fibre	True Protein	Oil	Carbo-hydrates and Fibre
Linseed Cake	30	10	35	9	24	9	33
Decorticated Cotton Cake	40	10	26	8	33	9	19
Undecorticated Cotton Cake	23	5½	32	21	16½	5	22
Soya Cake	42	7	26	5	34	6	23
Decorticated Ground Nut Cake	47	7½	23	6	41	7	20
Coco-nut Cake	21	10	41	11	16	9	41
Palm-nut Cake	18½	7½	45	13	16	7	40
Beans	25	1½	48	7	19	1¼	48
Peas	23	1½	54	5	17	1	52
Brewers' Grains (wet) ..	7½	2½	14	5	5	2½	12
Do. (dry) ..	18	6	46	15	12	5½	35
Distillers' Grains (dry) ..	27	11	41	10	18	10	30
Malt Coombs	24	1½	48	11	12	1	41
Dried Yeast	48	1½	35	1	40	¼	33
Fish Meal	56	5	-	-	46	4	--
Bran	14	4	53	11	10	3	44
Pollards	16	3½	64	2	13	3	54
Molasses or Treacle (Beet)	10	-	60	---		—	55
Linseed or Flax Seed ..	24	36	23	6	18	34	20
Wheat	12	2	69	2	9	1¼	65
Barley	9	2	68	5	6	1¼	65
Oats	10	5	58	10	7	4	48
Maize or Indian Corn ..	10	5	69	2	7	4	67
Maize Germ Meal ..	13	12	56	4	9	11	51
Rice Meal	13	13	50	6	7	11	41
Meadow Hay (good) ..	9	2½	41	26	4	1	41
"Seeds" Hay	12	2½	37	27	5	1½	40
Silage (Oats and Legumes)	4	1	10	7	1½	½	10
Pasture Grass	3	¾	10	4	1¾	½	10
Oat Straw	3	2	43	33	¾	½	38
Potatoes	2	$\frac{1}{10}$	20	1	$\frac{1}{10}$	$\frac{1}{10}$	18
Mangels	1	$\frac{1}{10}$	9	1	$\frac{1}{10}$	$\frac{1}{10}$	9
Swedes	1¼	¼	8	1½	¼	$\frac{1}{10}$	8
Turnips	1	¼	6	1	¼	$\frac{1}{10}$	6
Carrots	1¼	¼	9½	1½	½	$\frac{1}{10}$	10
Cabbage	1½	½	6	2	¾	¼	6
Sugar Beet	$1\frac{1}{10}$	$\frac{1}{10}$	20	$1\frac{1}{10}$	$\frac{1}{10}$	--	19¾

FIELD EXPERIMENTS, 1948

Experiments conducted by the County Agricultural Instructors in 1948 included variety trials with spring wheat, barley and potatoes. Further trials were also carried out in the use of a Gammexane dust in controlling wireworm and leather-jacket in spring sown cereals, and in the use of a "Hormone" selective spray for weed control. Details of the trials in each County may be obtained by applying to the Secretary of the Committee of Agriculture concerned.

SPRING WHEAT VARIETY TRIALS.

The results of trials conducted in 1946 in which Atle and Progress were compared were published among those of other field experiments in this Journal, Vol. XLIV. Trials with these varieties were again laid down in 1947 and the results published in this Journal, Vol. XLV. In 1948, further trials to compare these varieties were conducted by the Agricultural Instructors at 60 centres in all counties. The plots were, in nearly all cases, about a half statute acre in area, and with a few exceptions were sown on land which had carried a manured crop the previous season. The dates of sowings, together with the yields of grain obtained, and the relative times of ripening are shown in the table. Germination and subsequent progress were satisfactory, except at a small number of centres where the crops showed a slight yellowing of the foliage. Progress was generally the more vigorous in vegetative growth, and maintained a slight superiority through the season.

The incidence of disease was very slight. Black Stem Rust was reported from only 1 centre, Progress being the more severely attacked. "Take-all" was mentioned in reports from 9 centres. At 7 of these the attack was equally severe on both varieties. At one of the remaining centres, Atle was the more severely attacked, while at the other, the attack was worst on Progress. A slight attack of Ear Blight was reported from 1 centre.

The straw of Progress grew somewhat longer than that of Atle, but exhibited good standing qualities, serious lodging being reported from only two centres. The records of relative times of ripening do not reveal any pronounced difference between the varieties in this respect. Progress was later in ripening at 27 centres, earlier at 17 centres, while the two varieties ripened at the same time at 16 centres. The difference was not more than 9 days at any centre, and exceeded 5 days at only 5 centres.

The grain of both varieties was, with few exceptions of good quality, but a number of reports indicated that the grain of Progress was larger, plumper, and generally more attractive than that of Atle. Only in a few cases was the grain of Atle stated to be the better. Progress also appeared to be less susceptible than Atle to soil acidity or lime deficiency. The average yield of grain obtained from Progress was significantly higher (1 per cent. point) than that obtained from the varietv Atle.

Centre	Date of Sowing	Approximate time of ripening of *Progress* as compared with *Atle*	Yield of Grain per Statute Acre			
			Atle		Progress	
			cwt.	qr.	cwt.	qr.
Carlow	20th March ..	1 day later	28	2	27	0
Cavan	13th March ..	2 days later	25	1	32	2
do.	15th March ..	4 days earlier	25	0	20	1
Clare	10th March ..	4 days earlier	13	3	14	2
do.	18th March ..	4–5 days earlier ..	22	3	26	1
Cork	8th March ..	At the same time ..	27	1	25	3
do.	13th March ..	At the same time ..	17	2	21	2
do. (N.W.) ..	18th March ..	3 days earlier	22	3	26	0
do. (S.E.) ..	23rd March ..	3 days later	24	0	23	3
do.	27th March ..	At the same time ..	23	0	22	1
Donegal	2nd April ..	2 3 days earlier ..	17	3	19	1
Dublin	5th May ..	3–4 days later ..	36	0	36	3
do.	11th March ..	3-4 days later ..	25	3	27	3
Galway	22nd March ..	4 days earlier	19	0	16	0
do.	18th March ..	At the same time ..	19	0	19	3
do.	23rd March ..	3 days earlier	28	0	27	3
Kerry	3rd April ..	2–3 days earlier ..	10	1	16	2
do.	29th March ..	4 days earlier	17	2	25	0
Kildare	7th April ..	2–3 days earlier ..	25	2	26	3
do.	7th April ..	2 days later	14	2	16	3
Kilkenny ..	20th March ..	5 days later	25	1	27	3
do. ..	13th March ..	6-7 days later ..	12	3	19	1
Laoighis	26th March ..	4 days later	19	1	20	3
do.	5th April ..	3 days later	27	0	29	2
Leitrim	24th March ..	At the same time ..	18	2	19	3
do.	29th March ..	3–4 days later ..	20	0	26	1
Limerick W. ..	16th March ..	At the same time ..	30	2	26	3
do. ..	26th March ..	2 days earlier	21	2	22	3
do. ..	12th March ..	4 days later	22	2	23	1
do. ..	26th March ..	3–4 days earlier ..	21	2	22	3
Limerick E. ..	8th March ..	9 days later	21	2	28	0
do. ..	10th March ..	At the same time ..	19	2	17	0

	Date of Sowing	Date of Ripening: Ymer	Freja	Camton	Kenia	Kenia x Spratt Archer x Kenia 6/3 No. 5	Yields of Grain per Statute Acre: Ymer	Freja	Camton	Kenia	Kenia x Spratt Archer x Kenia 6/3 No. 5	REMARKS
							c. q.	c. q.	c. q.	c. q.	c. q.	
Cavan	12th April	26th Aug.	23rd Aug	6th Sept.	—	—	29 2	29 0	18 1	—	—	Straw of Camton longer than other varieties, inclined to break below the head. Camton had larger grain.
do.	13th ,,	24th ,,	19th ,,	4th ,,	—	—	32 2	35 3	28 1	—	—	
Clare .	15th Mar	1st Aug.	4th Aug	8th Aug.	..	—	21 1	20 3	18 2	—	—	Camton straw longest, braird inclined to be thin. This variety produced the largest grain.
do.	13th April	6th ,,	8th ,,	18th ,,	—	—	23 0	24 0	19 2	—	—	
do ..	30th Mar.	9th ,,	6th ,,	16th ,,	—	—	20 3	19 0	16 1	—	—	
Cork ...	19th April	19th Aug.	14th Aug.	..	23rd Aug.	19th Aug.	28 3	31 1	—	30 2	24 1	The straw of Freja was somewhat shorter than that of the others. Freja shed slightly.
do. . .	6th Mar.						25 3	25 2	—	28 0	26 0	
do.	9th ,,	4th ,,	1st ,,	—	7th ,,	10th ,,	24 2	24 3	—	22 2	25 1	
do. .	30th April	22nd ,,	22nd ,,	—	22nd ,,	22nd ,,	13 2	16 0	—	10 1	14 0	
do. . .	16th Mar	1st ,,	26th July	—	1st ,,	1st ,,	39 1	41 1	—	37 0	37 2	
do. .. .	15th April	24th ,,	27th Aug.	—	27th ,,	19th ,,	25 3	26 2	—	25 0	30 0	
Donegal	24th Mar	16th Aug.	20th Aug.	27th Aug.	—	—	21 3	25 0	17 3	—	—	Camton and Ymer attacked by Gout Fly. Camton straw longest, grain coarsest.
Dublin .	22nd Mar	10th Aug.	7th Aug	17th Aug.	—	—	28 3	25 0	17 1	—	—	Camton most vigorous braird, also gave longest straw. Camton inclined to shed, grain rather coarse.
do.	7th April	10th ,,	8th ,,	15th ,,	—	—	30 0	24 3	12 1	—	—	
Galway	12th Mar	21st Aug.	20th Aug	27th Aug	—	..	16 0	14 2	9 0	—		Camton was rather slow to establish itself in the early stages, but improved later. Straw of Camton was longer and somewhat stronger than the other varieties, grain larger and not of such good quality. Camton inclined to shed.
do.	10th April	10th ,,	16th ,,	26th ,,	—	—	39 0	40 1	25 3	.		
do.	6th ,,	6th ,,	8th ,,	15th ,,	—	—	14 1	13 0	11 1	.	—	
do. .	9th ,,	15th ,,	13th ,,	24th ,,	—	—	30 3	31 0	20 3	—	—	
Kerry	9th Mar.	2nd Aug	1st Aug.	—	4th Aug.	1st Aug.	29 3	27 3	—	25 3	28 0	Kenia x Spratt Archer x Kenia 6/3 No. 5 had longest straw.
do .	6th April	13th ,,	2nd ,,	—	13th ,,	6th ,,	34 2	40 3	—	29 3	32 1	
Kildare	20th Mar.	13th Aug.	16th Aug.		13th Aug.	11th Aug.	11 1	15 2	—	14 0	17 1	Braird of Ymer thinnest and the grain was of poorer quality than other varieties.
Leitrim .	27th Mar.	30th Aug.	26th Aug.	7th Sept	..	—	10 0	17 2	12 0	—	—	Soil very poor. Many plants died out. Camton straw longest. Lodging occurred in all plots.
do.	10th April	4th Sept.	30th ,,	9th ,,		—	7 0	10 1	9 1	—	—	
Limerick .	14th Mar.	1st Aug.	1st Aug.	1st Aug.	—	—	18 2	20 0	19 0	—	—	Freja straw somewhat shorter than others. Grain from most plots was of good quality. There was very little shedding and only slight lodging.
do.	24th ,,	9th ,,	6th ,,	—	10th Aug	8th Aug.	21 2	23 0	—	22 1	21 0	
do.	15th April	15th ,,	12th ,,	—	—	—	22 3	22 1	—	—		
do.	26th Mar.	4th ,,	4th ,,	—	4th Aug.	4th Aug.	17 3	18 2	—	20 1	20 3	
do. ..	18th ,,	9th ,,	9th ,,	—	9th ,,	9th ,,	27 2	25 1	—	23 3	22 2	
Longford	5th April	18th Aug.	12th Aug.	30th Aug.	—	—	21 1	25 2	13 2	—		Germination and establishment in Camton not so good as others. Straw longest in Camton.
Mayo . ..	20th April	20th Aug.	20th Aug	—	—	—	16 2	16 3	—		—	Freja was slightly more vigorous.
do.	22nd ,,	25th ,,	25th ,,	—		—	17 3	17 3	—	—	..	
do. ..	9th ,,	24th ,,	21st ,,	—	—	—	27 3	27 1	—	—	—	
do. ..	9th ,,	23rd ,,	18th ,,	—		—	20 1	22 2	—	—	—	
Meath .	6th April	1st Sept.	29th Aug.	—	4th Sept	4th Sept.	12 2	14 2	—	16 0	17 3	Plots checked by frost in May. Freja produced poorest sample of grain.
Monaghan .	29th Mar.	18th Sept.	13th Aug.	—	—	—	24 2	22 1	—	—	—	Freja was slightly more vigorous in the early stages, but straw was shorter than that of Ymer.
do. ...	2nd April	9th ,,	5th ,,	—	—	—	25 3	26 3	—	—	..	
do. ...	14th ,,	15th ,,	12th ,,	—		—	26 2	24 1	—	—		
Roscommon ..	5th April	28th Sept.	28th Aug.	—	2nd Sept	2nd Sept.	13 3	12 1	—	18 1	17 0	Plots rather thin. Ymer and Freja shed slightly and produced smaller grain.
Sligo	26th April	16th Aug.	10th Aug.	—	...	—	16 2	15 1	—	..	—	Freja more vigorous in early stages and produced longer straw. There was slight attack of Loose Smut.
do. . .	19th ,,	9th Sept.	5th Sept.	—	—	—	18 2	16 1		—	..	
Tipperary S. .	7th April	6th Sept.	28th Aug.	—	1st Sept	3rd Sept.	17 3	18 2	—	16 0	12 3	Attack of "Take all"
do.	7th ,,	5th ,,	27th ,,	—	—	—	13 1	19 3	—	—	—	
do. ..	8th Mar.	21st Aug.	21st ,,	—	21st Aug.	21st Aug.	8 3	8 1	—	9 1	9 1	
Waterford ...	15th Mar.	12th Aug.	10th Aug.	—	10th Aug.	10th Aug.	12 0	14 3	..	14 1	10 3	Kenia x Spratt Archer x Kenia 6/3 No. 5 was attacked by "Take-all."
do.	31st ,,	18th ,,	18th ,,	—	18th ,,	18th ,,	15 2	17 3	—	13 3	17 0	
Westmeath ..	5th May	19th Aug.	13th Aug.	—	—	—	23 1	18 2	—	—	—	Freja established itself more rapidly and had slightly longer straw.
					Means: 46 Centres ...		21 3	22 1	—	—	—	
					Means: 18 Centres ...		21 0	22 0	—	21 0	21 1	
					Means: 16 Centres ...		22 3	23 2	16 3	—	—	

Centre	Date of Sowing	Approximate time of ripening of *Progress* as compared with *Atle*	Yield of Grain per Statute Acre			
			Atle		Progress	
			cwt.	qr.	cwt.	qr.
Longford	18th March ..	At the same time ..	22	0	25	2
do.	9th March ..	3–4 days earlier ..	16	0	18	1
Louth	16th March ..	At the same time ..	21	1	19	0
Mayo	10th March ..	3 days earlier	20	2	21	1
do.	20th March ..	4 days later	20	3	22	3
do.	19th March ..	4 days earlier	16	1	17	0
Meath	13th March ..	At the same time ..	25	3	23	1
do.	6th April ..	At the same time ..	19	2	23	1
do.	15th March ..	At the same time ..	34	2	31	2
Monaghan ..	2nd April ..	At the same time ..	13	2	12	2
do. ..	16th March ..	2–3 days later ..	15	2	16	2
Offaly	26th March ..	2 days later	25	0	23	2
do.	20th March ..	6 days later	29	2	23	0
Roscommon ..	28th February	5–6 days earlier ..	22	1	25	2
do.	12th March ..	At the same time ..	19	1	20	0
do.	12th March ..	1–2 days later ..	19	3	22	2
Sligo	25th March ..	5 days earlier	23	1	22	3
do.	16th April ..	2–3 days later ..	24	2	16	3
Tipperary N.R. ..	1st April ..	5 days later	22	2	24	0
do. ..	30th March ..	2 days later	30	3	29	3
Tipperary S.R. ..	29th March ..	At the same time ..	25	3	23	2
do. ..	8th March ..	At the same time ..	22	1	21	2
Waterford ..	24th February	5 days later	15	3	19	1
do. ..	12th March ..	3 days later	8	3	10	2
Westmeath ..	2nd April ..	6 days later	19	2	14	1
Wexford	25th March ..	3 days later	15	1	19	1
Wicklow E. ..	11th March ..	2 days later	22	1	24	2
do. W. ..	11th March ..	1 day later	37	0	35	3
		Mean (60 Centres) ..	21	3	22	3

Significant difference (1% point) = 0.58 cwt.

BARLEY VARIETY TRIALS, 1948.

Trials with the varieties Ymer and Freja were conducted by the Instructors in Agriculture at 46 centres in 19 counties; with Ymer, Freja and Camton at 16 centres in 8 counties; and with Ymer, Freja, Kenia, and Kenia x Spratt-Archer x Kenia 6/3 No. 5 at 18 centres in 8 counties. Each plot was a half statute acre in area.

Germination and establishment were satisfactory at most centres. Camton, however, was slower in germinating than the other varieties, but subsequently established itself well and made good growth. The straw of this variety was

longer than that of the others with which it was tested, but it resisted lodging well. In general, the grain of Camton was of coarser quality than that of either Ymer or Freja.

Ymer and Freja produced very short straw. The grain was of good quality generally.

Kenia x Spratt-Archer x Kenia 6/3 No. 5 produced longer straw than the other varieties with which it was compared and yielded grain of good quality. At 22 centres the crop was sown on land which had carried a manured root crop the previous season. At these centres yields were satisfactory. At 7 centres the crop was sown following oats and at these centres yields appeared to be least satisfactory. In most of these cases neither the previous oat crop nor the barley crop received any manurial treatment. At 8 centres the barley was grown on lea but received a dressing of artificial manures or farmyard manure. At these centres yields were fair. At the remaining centres the crop was grown following spring wheat and in these cases yields were moderate.

There was no serious outbreak of disease or pests although there was a slight attack of loose smut at 5 centres, mildew at 3, take-all at 4 and leaf stripe at 1. Freja suffered a fairly severe attack of loose smut at the Sligo centres.

Insect pests were reported from 4 centres. At one of these centres (Donegal) Camton and Ymer were rather badly attacked by Gout fly. At the other 3 centres an attack of wireworm was reported but this pest was not serious except in Longford where Camton was rather severely attacked.

There was some damage by birds and rabbits at 5 centres, the only serious damage being in Kildare where Ymer was heavily attacked by crows.

The dates of sowing, relative times of ripening, yield of grain and other relevant observations are recorded in the table.

POTATO VARIETY TRIALS.

Trials were conducted by the Instructors in Agriculture at 64 centres in all counties during 1948 to compare the varieties Ulster Commerce, Stormont Dawn and Kerr's Pink.

Ulster Commerce is a maincrop variety. The skin is white, the flesh yellow and the eyes medium. The foliage is tall, strong and upright. Tubers are round. Stormont Dawn is also a maincrop variety having kidney shaped tubers, white skin and white flesh. The eyes are medium and the foliage fairly tall and strong.

The dates of planting and digging, and yields of tubers are given in the accompanying table.

The three varieties were compared in respect of susceptibility to blight, time of ripening, cooking quality and suitability for general cultivation.

YIELD OF TUBERS PER ACRE

Centre	Date Planted	Date of Digging	Ulster Commerce: Ware	Ulster Commerce: Small	Ulster Commerce: Ware & Small	Ulster Commerce: Diseased	Stormont Dawn: Ware	Stormont Dawn: Small	Stormont Dawn: Ware & Small	Stormont Dawn: Diseased	Kerr's Pink: Ware	Kerr's Pink: Small	Kerr's Pink: Ware & Small	Kerr's Pink: Diseased
			T. C. Q.	T. C. Q.	T. C. Q.	T. C. Q.	T. C. Q.	T. C. Q.	T. C. Q.	T. C. Q.	T. C. Q.	T. C. Q.	T. C. Q.	T. C. Q.
Carlow ...	April 20th	Oct. 29th	7 10 1	1 1 1	8 11 2	0 17 3	8 8 1	1 13 3	10 2 0	0 14 2	10 3 3	3 16 3	14 0 2	0 19 1
Cavan	April 24th	Oct. 16th	10 5 0	2 2 0	12 7 0	0 14 0	9 3 0	1 12 0	10 15 0	2 4 0	12 2 0	1 8 0	13 10 0	1 4 0
do.	,, 24th	Nov. 15th	4 10 0	0 14 1	5 4 1	0 14 1	4 5 3	0 18 2	5 4 1	0 4 1	4 5 3	1 8 2	5 14 1	0 10 0
Clare ...	April 12th	Sept. 20th	10 14 1	2 5 3	13 0 0	—	12 17 0	1 14 2	14 11 2	—	12 5 3	2 8 2	14 14 1	—
do. (W.) ...	,, 20th	,, 28th	6 15 2	2 15 1	9 10 3	—	11 0 0	2 6 2	13 6 2	—	8 3 2	3 12 2	11 16 0	—
do.	,, 14th	Oct. 22nd	9 18 1	2 1 2	11 19 3	—	11 13 3	1 14 1	13 8 0	0 5 3	12 15 0	1 17 1	14 12 1	—
Cork	April 23rd	Oct. 12th	8 3 3	1 6 0	9 9 3	0 10 2	12 14 2	1 6 0	14 0 2	0 7 3	9 1 3	1 16 1	10 18 0	0 7 3
do.	,, 8th	Sept. 25th	8 14 1	1 8 2	10 2 3	0 0 3	12 5 3	1 5 3	13 11 2	0 5 3	11 5 3	1 14 1	13 0 0	0 5 3
do.	Mar. 27th	Oct. 25th	11 7 1	0 19 2	12 6 3	0 14 0	13 13 1	0 12 2	14 5 3	0 9 3	13 13 3	1 15 0	15 8 3	0 11 1
do. (N.W.)	April 22nd	,, 26th	6 12 0	0 4 2	6 16 2	0 9 0	6 11 0	0 5 2	6 16 2	0 2 1	5 2 0	0 10 2	5 12 2	0 6 2
do. (S.E.) ...	Mar. 25th	,, 5th	14 2 3	1 0 0	15 2 3	—	13 18 2	1 0 0	14 18 2	—	12 7 1	2 8 2	14 15 3	—
Donegal ...	April 27th	Oct. 11th	12 14 1	0 15 3	13 10 0	0 18 2	13 5 3	0 15 0	14 0 3	0 0 3	10 11 2	1 2 3	11 14 1	0 10 0
do. ...	,, 20th	,, 12th	7 15 1	1 16 3	9 12 0	0 8 3	11 16 2	1 8 3	13 5 1	0 0 2	9 4 3	2 15 3	12 0 2	0 1 3
Dublin ...	Mar. 4th	Dec. 3rd	9 15 3	3 10 0	13 5 3	—	12 0 0	3 19 3	15 19 3	—	9 6 1	4 4 1	13 10 2	—
do. ...	April 29th	Nov. 4th	11 14 0	1 3 2	12 17 2	—	12 6 2	1 0 2	13 7 0	—	10 0 3	2 7 2	12 8 1	—
Galway ..	April 14th	Oct. 11th	8 14 2	2 0 1	10 14 3	0 11 3	10 12 3	1 5 1	11 18 0	0 5 1	8 12 2	2 13 0	11 5 2	0 9 2
do.	,, 15th	Nov. 16th	12 12 3	0 18 2	13 11 1	0 15 3	13 10 0	1 14 1	15 4 1	0 2 3	14 1 2	1 4 1	15 5 3	0 2 1
do.	,, 29th	Oct. 25th	11 7 0	1 14 2	13 1 2	0 9 0	9 4 2	1 13 0	10 17 2	—	8 12 1	2 15 2	11 7 3	0 8 1
Kerry	April 10th	Sept. 24th	10 14 0	1 1 0	11 15 0	0 13 0	12 4 0	0 18 0	13 2 0	1 7 0	10 6 0	0 14 0	11 0 0	0 14 0
do.	,, 6th	Oct. 20th	14 4 1	1 1 1	15 5 2	0 0 2	10 13 2	2 2 2	12 16 0	0 0 2	14 6 0	2 18 0	17 4 0	0 0 3
do.	,, 29th	,, 8th	7 14 1	0 17 0	8 11 1	3 14 1	11 5 3	0 17 0	12 2 3	1 14 1	10 0 0	1 14 0	11 14 0	0 5 3
Kildare ...	April 21st	Oct. 19th	7 4 1	1 4 3	8 9 0	0 3 2	8 0 0	1 1 2	9 1 2	0 3 0	8 2 2	1 8 0	9 10 2	0 9 2
do. ...	1st week Apr.	,, 18th	8 10 2	1 8 1	9 18 3	0 1 3	8 16 0	0 17 0	9 13 0	0 0 2	7 1 0	1 17 2	8 18 2	0 17 2
Kilkenny ...	April 14th	Oct. 21st	11 3 2	1 1 0	12 4 2	0 2 0	14 13 3	1 3 0	15 16 3	0 4 2	12 2 2	2 2 1	14 4 3	0 1 0
Laoighis ...	April 14th	Nov. 8th	6 17 1	0 14 2	7 11 3	0 6 0	8 3 0	1 0 2	9 3 2	0 0 2	7 1 1	1 12 2	8 13 3	0 3 3
do. ...	,, 9th	Oct. 6th	4 8 2	0 8 2	4 17 0	0 1 1	4 1 3	0 5 3	4 7 2	0 0 3	6 8 3	0 16 3	7 5 2	0 1 3
do. ...	,, 6th	,, 22nd	4 6 3	0 19 2	5 6 1	0 0 3	4 19 2	0 10 3	5 10 1	0 0 2	6 0 2	1 7 2	7 8 0	0 1 1
Leitrim ...	April 20th	Oct. 12th	9 17 0	1 8 0	11 5 0	0 4 0	10 12 0	1 13 0	12 5 0	0 4 2	10 2 0	1 17 0	11 19 0	0 3 3
do. ...	,, 9th	,, 8th	8 8 2	0 8 2	8 17 0	0 17 1	13 5 3	0 5 3	13 11 2	0 0 3	11 0 0	0 17 1	11 17 1	0 12 3
Limerick (W.)	End of Apr.	Early Oct.	14 2 0	1 0 0	15 2 0	0 2 0	18 2 0	0 14 0	18 16 0	0 2 2	14 0 0	0 15 0	14 15 0	0 4 0
do. ...	April	October	11 0 0	1 8 0	12 8 0	0 10 0	14 6 0	0 6 0	14 12 0	—	12 6 0	1 10 0	13 16 0	0 10 0
do. ...	April 20th	Oct. 15th	8 15 0	1 2 0	9 17 0	0 12 0	6 0 0	1 10 0	7 10 0	0 15 0	7 10 0	0 15 0	8 5 0	0 15 0
do. (E.) ...	Mar. 30th	,, 21st	8 5 2	0 9 3	8 15 1	2 14 1	8 1 1	0 12 2	8 13 3	1 10 3	7 13 2	0 17 3	8 11 1	1 6 2
Longford ...	April 8th	Oct. 10th	10 4 3	1 5 0	11 9 3	—	11 3 0	0 11 2	11 14 2	—	9 17 2	1 4 0	11 1 2	0 4 2
do. ...	,, 4th	Nov. 19th	8 2 3	1 0 0	9 2 3	2 12 3	12 0 0	0 18 2	12 18 2	1 0 0	9 0 0	1 4 1	10 4 1	1 11 1
Louth	April 14th	Oct. 6th	12 0 3	0 10 3	12 11 2	0 0 2	14 5 0	0 12 2	14 17 2	—	11 5 0	1 5 0	12 10 0	0 1 2
Mayo	April 6th	Oct. 21st	11 2 3	0 10 0	11 12 3	—	13 0 0	0 15 0	13 15 0	—	8 2 3	1 2 0	9 4 3	0 5 3
do.	,, 24th	,, 20th	12 4 2	0 15 0	12 19 2	—	14 0 0	0 13 0	14 13 0	—	10 2 0	1 2 0	11 4 0	—
do.	,, 2nd	,, 4th	11 14 1	1 8 2	13 2 3	0 11 2	13 15 3	2 2 3	15 18 2	0 7 1	13 11 2	2 17 1	16 8 3	0 2 3
Meath	April 1st	Oct. 19th	12 17 0	2 8 0	15 5 0	—	17 13 0	1 7 0	19 0 0	—	15 5 1	2 6 3	17 12 0	—
do.	Mar. 25th	Oct. 19th	10 13 0	0 8 0	11 1 0	—	12 16 0	0 4 0	13 0 0	—	12 10 0	0 19 0	13 9 0	—
do.	,, 27th	,, 23rd	10 19 1	0 18 0	11 17 1	0 4 2	9 13 0	0 18 1	10 11 1	0 1 0	8 6 2	1 8 3	9 15 1	0 3 1
Monaghan ...	1st week Apr.	Dec. 20th	7 10 1	1 1 3	8 12 0	0 1 1	7 3 2	1 3 2	8 7 0	0 1 2	9 8 1	1 14 2	11 2 3	0 3 1
do. ...	April 30th	1st week Nov	15 10 0	0 15 3	16 5 3	0 1 2	16 11 2	0 14 1	17 5 3	0 1 2	16 5 3	0 17 1	17 3 0	0 2 3
Offaly ..	April 20th	Oct. 8th	11 9 0	3 4 1	14 13 1	—	13 11 0	3 13 2	17 4 2	—	10 8 1	6 0 3	16 9 0	—
do. ...	,, 29th	Nov. 2nd	2 19 1	1 11 0	4 10 1	0 1 0	4 10 1	1 5 0	5 15 1	0 1 1	3 6 2	1 13 1	4 19 3	—
Roscommon ..	April 17th	Oct. 14th	6 10 2	0 14 1	7 4 3	1 14 0	5 11 2	0 17 1	6 8 3	0 19 3	6 7 2	1 3 0	7 10 2	1 18 1
do. ...	,, 12th	1st week Oct	11 2 2	1 2 0	12 4 2	0 0 2	7 16 1	1 0 2	8 16 3	0 0 3	8 16 1	1 13 2	10 9 3	0 1 1
do. ...	,, 21st	Oct. 22nd	4 17 3	1 5 0	6 2 3	2 10 0	8 17 2	1 10 0	10 7 2	0 3 2	7 0 0	0 15 2	7 15 2	2 5 3
Sligo	April 19th	Oct. 12th	10 8 0	1 7 0	11 15 0	0 7 0	13 19 0	0 18 2	14 17 2	0 5 2	11 18 0	1 13 0	13 11 0	0 6 0
do	Mar. 23rd	,, 20th	11 7 1	0 12 3	12 0 0	0 14 1	14 5 3	1 0 0	15 5 3	0 2 3	11 15 3	1 14 1	13 10 0	0 8 2
Tipperary N.R.	April 29th	Oct. 23rd	6 6 0	0 3 2	6 9 2	0 1 0	7 0 0	0 4 0	7 4 0	—	6 1 0	0 15 0	6 16 0	0 1 2
do. ...	,, 26th	,, 7th	9 17 0	0 8 2	10 5 2	—	10 17 0	0 9 0	11 6 0	—	8 9 0	0 8 0	8 17 0	—
do. ..	,, 23rd	,, 18th	6 9 0	1 0 0	7 9 0	0 3 0	9 6 0	0 12 0	9 18 0	—	4 7 0	2 0 0	6 7 0	0 6 0
Tipperary S.R.	April 5th	Oct. 12th	15 0 0	0 12 2	15 12 2	—	15 0 0	1 0 0	16 0 0	—	14 0 0	2 0 0	16 0 0	—
do. .	Mar. 19th	,, 19th	9 14 2	0 10 1	10 4 3	—	9 18 1	0 12 2	10 10 3	—	11 2 0	0 8 2	11 10 2	0 9 3
Waterford ...	April 9th	Nov. 10th	7 12 0	2 0 0	9 12 0	0 1 0	[illegible] 0 0	1 10 0	11 10 0	0 1 0	8 12 0	2 0 0	10 12 0	0 2 0
do. ...	,, 5th	Sept 22nd	10 6 0	1 4 0	11 10 0	—	12 3 0	1 4 0	13 7 0	—	12 10 0	1 10 0	14 0 0	—
do. ..	,, 7th	,, 22nd	10 15 0	1 3 0	11 18 0	—	14 9 0	0 12 0	15 1 0	—	15 3 0	1 3 0	16 6 0	—
Westmeath ...	April 15th	Oct. 14th	7 14 1	1 17 0	9 11 1	0 4 1	14 4 1	1 11 2	15 15 3	0 8 2	8 12 3	3 8 2	12 1 1	0 3 0
Wexford ...	April 10th	Sept. 23rd	10 12 1	0 11 2	11 3 3	0 11 2	11 4 1	0 12 1	11 16 2	0 2 0	11 6 2	1 1 0	12 7 2	0 10 2
do. ..	,, 28th	Oct. 5th	12 8 0	0 6 0	12 14 0	0 5 2	15 0 0	0 7 0	15 7 0	0 1 2	15 2 2	0 10 3	15 13 1	0 4 2
Wicklow (E.)	April 26th	Oct. 15th	9 3 1	0 12 1	9 15 2	0 7 0	10 12 0	1 3 0	11 15 0	0 5 1	8 4 0	1 1 0	9 5 0	0 11 3
do. ...	,, 14th	,, 15th	10 0 0	1 8 2	11 8 2	3 2 3	13 8 2	1 11 2	15 0 0	0 8 2	11 0 0	3 17 1	14 17 1	2 5 3
Average (64 Centres)			9 12 2	1 3 2	10 16 0	0 9 [illegible]	11 3 3	1 2 2	12 6 1	0 5 0	10 1 0	1 15 0	11 16 0	0 7 3

At 12 centres the incidence of blight was negligible, while at 15 centres all varieties displayed an apparently similar degree of resistance to the disease. Reports from the remaining centres indicate that Ulster Commerce was most resistant, Stormont Dawn least resistant, and Kerr's Pink intermediate.

Stormont Dawn ripened earliest at 25 centres, Ulster Commerce at 10, and Kerr's Pink at 7, while all varieties ripened at the same time at 15 centres. Kerr's Pink and Ulster Commerce ripened latest at 18 and 16 centres respectively. At only 5 centres was Stormont Dawn latest to ripen.

Stormont Dawn appeared to be the least satisfactory variety as regards cooking quality, being described as "poor" in this respect at 12 centres; "fair" at 24; "good" at 18; and "very good" at 9. Ulster Commerce would appear to be of good table quality, falling into the "poor" category at only 3 centres, and "fair" at 5. At the remaining centres it was described as "very good" at 36, and "good" at 19. Kerr's Pink did not fall below the "good" standard at any centre, and was described as very satisfactory at 44 centres.

The majority of the reports indicate that both Ulster Commerce and Stormont Dawn are suitable for general cultivation, the varieties being reported as unsatisfactory at only 6 and 7 centres respectively, while reports from a further 8 centres indicated that a further trial with both varieties was desirable. Kerr's Pink, an old established variety, proved suitable for general cultivation at all centres.

TRIALS WITH A GAMMEXANE DUST FOR CONTROL OF WIRE-WORMS AND LEATHER-JACKET GRUBS IN CEREAL CROPS.

A report on trials with a Gammexane dust for control of wireworms and leather-jacket grubs in cereal crops in 1947 was published in this Journal, Vol. XLV, page 77. Further trials, as described below, were arranged by the Instructors in Agriculture in 1948.

TRIALS FOR CONTROL OF WIREWORMS IN OAT CROPS.

These were arranged at 56 centres in 28 counties. The plots varied from 1/20th of an acre to 2 acres in size, but at more than half the centres they were $\frac{1}{8}$ or $\frac{1}{4}$ acre. They were replicated—four or more times at the majority of the centres—with control and treated plots alternating. The rate of application of the Gammexane dust was 2 cwt. per acre.

At two centres, the dressing was applied when the crop was in braird and a severe infestation of wireworms became evident. At one of these centres, there was no evident control of the pest as a result of the dressing and no

apparent effect on the growth of the crop ; at the second a definite improvement was evident on the treated plot a week after the dust was applied and a good measure of control was attributed to it. The crop was taller and better on the treated plots.

At the remaining 54 centres, the dust was applied before or at the time of sowing the crop. At 33 of these, the crop showed no evidence of attack by the pest and did not, therefore, afford a trial of the material. There was no evidence of any effect, either stimulation or otherwise, of the dressing on the crop at 30 of these centres. Some stimulation to growth was apparent at the other three centres ; at one, the crop in braird on the treated plots appeared more vigorous ; on the second, the crop appeared thicker and more advanced in growth, while in the third case the appearance presented by the crop in the early stages of growth was such as might result from increased nitrification in the dressed plots.

At one further centre, although wireworms were abundant in the soil, there was no appreciable damage caused to the crop.

The extent of infestation and results from the dressing at the remaining 20 centres were roughly as follows :—

Severe infestation and damage to crop—7 centres.	Effective or good control at 4 centres.
	Some, but not satisfactory, measure of control apparent at 3 centres.
Intermediate degree of infestation and damage to crop —6 centres.	Effective control at 3 centres.
	Some evidence of control but not satisfactory at 3 centres.
Evidence of slight attack—7 centres.	Effective control at 2 centres.
	Some, but unsatisfactory degree of control at 2 centres.
	No evident control at 3 centres.

TRIALS FOR CONTROL OF WIREWORMS IN SPRING WHEAT.

These were conducted at 32 centres in 16 counties. Here again, the plots varied in size from 1/20th to 1 acre, but at most centres they were $\frac{1}{8}$ or $\frac{1}{4}$ acre and, except at two centres, there were two or more treated plots alternating with untreated or controls.

At 4 centres, the cereal was in braird when the dressing was applied. At one of these, there was only a very slight attack by the pest; at the other three, there was a severe attack which did not appear to be controlled or checked by the dressing.

At one centre where the dressing was applied a week after sowing the cereal, there was no apparent infestation.

At 18 centres, the infestation was negligible or so slight as not to afford any test of the dressing.

The following observations were made on the extent of infestation and degree of control apparent at the remaining 9 centres:—

(1) Attack fairly severe; good control.
(2) Crop reduced by about half in patches; very effective control.
(3) Both plots attacked, treated less severely; a good measure of control apparent.
(4) Appreciable attack; fair measure of control.
(5) Treated plots carried normal crop, controls about 80 per cent. normal; difference attributed to dressing.
(6) Control plots patchy and thin; some measure of control apparent.
(7) All plots attacked, treated less severely; slight measure of control.
(8) Attack noticeable but not severe; whole crop recovered quickly and there was no apparent benefit from the dressing.
(9) Big wireworm population but attack not severe; no apparent benefit from the dressing.

The dressing had no apparent effect on the growth of the crop at 29 centres. At 2 centres—those referred to at Nos. (5) and (6) above—the crop appeared somewhat stimulated in growth on the treated plots, while at the remaining centre, where there appeared to be a fairly high wireworm population without noticeable damage to the crop, the appearance of the crop in the early stages of growth was such as might result from increased nitrification in the plots.

TRIALS FOR CONTROL OF LEATHER-JACKET GRUBS.

In conjunction with the trials for control of wireworms, observations were made by the Instructors in 15 counties at 24 centres where it was considered infestation with Leather-jacket Grubs might occur.

At 16 centres, the infestation was negligible and there was, therefore, no test of the efficacy of the dust nor did the dressing have any apparent effect on the growth of the crop at these centres. Particulars of the trials at the other 8 centres and the apparent effects observed are given in Table I.

TABLE I.

County	Crop	Area of each Plot	Time of application of Dressing	Extent of Infestation	Apparent Control of Pest	Apparent Effect on Crop
CAVAN ..	Oats	1 rood	When cereal was in braird.	All plots infested ; controls somewhat more severely.	A small measure of control attributed to the dressing.	No apparent stimulation of crop.
CLARE ..	Oats	½ rood	Before sowing cereal	Infestation slight ..	Very little, if any ..	Treated plots appeared to be slightly greener and more forward in growth.
CLARE ..	Oats	600 sq. yards	When cereal was in braird.	Some early infestation ; appeared to abate naturally.	None ; no apparent difference between treated and control plots.	None.
KERRY ..	Oats	¼ acre	Before sowing cereal	Infestation heavy ; damage considerable.	Some evidence of control : there was less damage to the treated plots which grew much thicker.	There was some stimulation to growth of the crop.
MAYO ..	Oats	½ rood	When cereal was in braird.	Some infestation ; not severe.	Effective control ; damage to braird ceased at once on the treated plots but continued on the untreated.	None.
MEATH ..	Oats	½ rood	Before sowing cereal	Control plots carried only about ¾ the crop grown on the treated plots. The difference was attributed to the use of Agrocide.		Plants in treated plots were somewhat longer and stronger than in the controls.
OFFALY ..	Oats	1 acre	Before sowing cereal	None	—	When the crop was in braird the treated plots were more vigorous than the controls. They appeared similar later.
TIPPERARY N.R.	Oats	8 sq. perches	Before sowing cereal	Although Leather-jacket grubs were present in considerable numbers they caused no apparent damage to any part of the crop.	—	None.

PLOTS TREATED PRIOR TO 1948.

Observations were made in 1948 on wireworm infestation and control in cereal crops grown at 22 centres where dust was tried on 1947 crops and at 2 centres where it was applied in 1946.

At one of the latter two centres, there was no noticeable attack by the pest and no difference in the crop on the plots treated and untreated in 1946. At the second centre, roots were grown in 1947 and oats in 1948. There was a normal crop of oats on the plots treated in 1946 while on the controls the plant population was half to three-quarters normal.

At 12 of the 22 centres where the dressing was applied in 1947, there was no evidence of wireworm attack in 1948. At 3 further centres, there was evidence of attack by the pest without any apparent difference between the plots which had been treated and those untreated. The observations made at the remaining seven centres are as follows : —

(1) *Oats sown in* 1948 *after lea oats in* 1947 *:* There appeared to be a lesser attack of wireworms in all the plots treated in 1947 than in the controls but the difference was not very much.

(2) *Oats sown in* 1948 *where plots of cereal in braird were treated with the dust in* 1947 *:* The plots which were untreated showed some evidence of wireworm attack in 1948 while the treated plots appeared to be entirely free. The braird appeared to be more vigorous in the treated plots, the outlines of which were clearly visible.

(3) *Wheat grown in* 1948 *after oats in* 1947 *:* In the latter year there was slight wireworm damage in two of the untreated plots. In 1948, there was rather severe damage in the same two plots with slight damage in two other untreated plots. There was no damage in the treated plots.

(4) *Barley grown in* 1948 *following spring wheat plots dressed in* 1947 *:* About one-third of the barley in braird in the control plots was destroyed by wireworms while the plots which had been treated escaped injury. Furthermore, the treated plots could be discerned from a distance due to the thickness and deeper colour of the braird, especially in the early grass stage.

(5) *Oats grown in* 1948 *after oats in* 1947 *:* When a satisfactory return was obtained from both treated and untreated plots. In 1948, the crop was much more vigorous and of better colour in the plots previously dressed than in the control plots.

(6) Oats sown in 1948 in plots dressed with the dust in 1947 was thicker, about 3″ taller and more vigorous with broader leaf than in the untreated plots where plant establishment was only about 70 per cent.

(7) Oats sown in 1948 after wheat plots dressed with the dust in 1947 produced plants which were more vigorous, thicker and taller than in the control plots.

SUMMARY OF THE RESULTS OF THE TWO SEASONS' TRIALS.

These trials were conducted with a view to (i) ascertaining whether control of wireworms and Leather-jacket Grubs in cereals can be secured by the use of a Gammexane dust and whether the material is satisfactory to use and (ii) observing what direct effects it might have upon the crops to which it was applied and what residual effects, if any, it might have on wireworm activity and on the crops in the following season.

The dressing was applied at the rate of 2 cwt. per statute acre to spring wheat and oat crops where infestation by the pests seemed likely and in a few cases to other crops also. The plots were mostly $\frac{1}{8}$ to $\frac{1}{2}$ acre in size, two or more being treated at each centre with alternating untreated plots for comparison. Except at a relatively small number of centres, the dressing was harrowed into the soil before or about the time of sowing the crop. Some further particulars of the trials and the number of centres involved in 1947 and '48, respectively, are summarised in the following table :—

TABLE II.

Gammexane dust applied	Wireworms		Leather-jacket Grubs		Two Years' Totals	
	1947	1948	1947	1948	Wire-worms	Leather-jacket Grubs
	Number of Centres					
Before or about time of sowing cereal ..	86	82	16	21	168	37
When cereal was in braird	13	6	12	3	19	15
To second cereal crop sown where the first had been destroyed by the pest ..	3	—	1	—	3	1
To flax crop in braird	—	—	1	—	—	1

Taking first the 4 centres where the dust was tried on a re-sown cereal: some measure of prevention of damage to the second crop was observed at two of the three centres where wireworms had destroyed the first, but at the third centre both treated and untreated plots of the second crop were equally damaged by the pest; at the fourth centre, where the first crop was destroyed by Leather-jacket Grubs, a small and unsatisfactory measure of control—represented by about 20 per cent. of a normal crop—resulted from use of the dust while Paris Green bait used on most of the second crop gave apparently complete protection and a normal crop developed.

Appreciable but incomplete control of Leather-jacket Grubs was observed where the material was applied to the flax crop in braird.

A rough classification of the remaining centres, according to the extent of infestation and damage to the crops and the degree of control observed, is shown in Table III for Wireworms and Leather-jacket Grubs respectively.

TABLE III.

Gammexane dust applied	Apparent Infestation and damage to Crop		Degree of Control observed			
			None	Slight	Moderate	Effective or Good
WIREWORMS.						
Before sowing cereal. 168 centres	None at 106 centres	Considerable or severe —39 centres	4 centres	8 centres	10 centres	17 centres
		Not severe—23 centres	9 centres	10 centres	10 centres	4 centres
When cereal in braird. 19 centres	None at 3 centres	Considerable or severe —15 centres	8 centres	1 centres	—	6 centres
		Not severe—1 centre	1 centre	—	—	—
LEATHER-JACKET GRUBS						
Before sowing cereal. 37 centres	None at 27 centres	Considerable or severe —5 centres	—	—	2 centres	3 centres
		Not severe—5 centres	4 centres	1 centre	—	—
When cereal in braird. 15 centres	None at 6 centres	Considerable or severe —6 centres	2 centres	1 centre	2 centres	1 centre
		Not severe—3 centres	2 centres	—	—	1 centre

At about two-thirds of all centres there was no apparent infestation or damage to the crop and, therefore, no test of the material.

Where infestation and damage to the crop was slight or inconsiderable, effective control was reported from a minority of the centres and, generally, the results in these cases were not favourable to the use of the dressing. It should, however, be noted that the assessment of beneficial results by observation is more difficult where the apparent attack and damage to the crop is not very great and it would be expected that the best test of the material is provided at those centres where the infestation and damage in the control plots were the more severe.

Where the dressing was applied before sowing the cereal, moderate to good control of wireworms was obtained at 27 of 39 centres where severe attack occured. Why negligible or only slight benefit resulted from the dressing at the other 12 centres is not apparent.

Moderate to good control of Leather-jacket Grubs was obtained at the small number of centres (5) where severe attack occurred and where the dust was applied before the cereal was sown.

In the case of both Wireworms and Leather-jacket Grubs, erratic but mostly unsatisfactory results were obtained from use of the dressing when the cereal was in braird. This is not the method of use recommended.

The evidence from the limited number of centres where leather-jackets were prevalent does not favour the use of the dust, either in anticipation of active infestation or when it becomes apparent, in preference to the use of Paris Green Bait as hitherto recommended.

The results from the trials in control of wireworms are very erratic, but they do indicate that if it is necessary to grow a cereal crop where conditions indicate that severe wireworm infestation is to be expected, a dressing of Gammexane dust mixed into the soil during preparation of the seed bed is worth a trial; but even when thus used it cannot, on these results, be regarded as a reliable preventative of pest damage to the crop.

Observations were made at 26 centres with a view to noting any residual effects which the dressing applied in 1947 (24 centres) and 1946 (2 centres) might have on wireworm activity in the crops grown on the same ground in 1948. In 10 cases, some evidence of residual effects was noted. At 4 centres, there appeared to be reduced wireworm attack while at two of these, plus 6 others (of the 10 centres), beneficial influence on the growth of the crop was mentioned.

Some stimulation to growth of the crop to which the dressing was directly applied was reported from a number of centres in both seasons. These reports were mainly from centres where there was wireworm infestation and some apparent control by the dressing. It is noteworthy that, in the two seasons, of about 140 centres where there was no noticeable infestation by the pests or damage to the crops, there were only 13 centres where beneficial effects on the growth of the crops were observed and it seems reasonable to conclude that the dust does not exert any consistent beneficial influence on the growth of cereal crops which would be a consideration in deciding upon its use.

From a small number of centres, it was reported that the dust was difficult to apply because of its fineness and that its smell was very objectionable.

TRIALS WITH A "HORMONE" SELECTIVE SPRAY FOR WEED CONTROL.

Trials were carried out by the Agricultural Instructors during 1946 to test the efficacy of a selective weed-killer containing 4-chloro-2-methyl phenoxy-acetic acid. The results of these trials were published in this Journal, Vol. XLIV. Further trials in the use of the preparation were conducted in 1947, and the results published in this Journal, Vol. XLV.

To obtain as much information as possible, regarding the efficacy of the spray, a further series of trials were conducted by the Instructors during 1948. There were two series of plots

(*a*) where weeds of the genus Brassica were prevalent ; and
(*b*) where one or more species of other weeds predominated.

With a view to ascertaining the optimum time to apply the preparation for the destruction of Brassica weeds, the spray was applied at different stages of weed development in separate experiments. The rates of application of the spray in the case of the Brassica weeds were 1 gallon in 100 gallons of water ; ½ gallon in 100 gallons of water ; 1 gallon in 59 gallons of water ; and ½ gallon in 59½ gallons of water per acre. These concentrations are referred to in the report as 1/100 spray ; ½/100 spray ; 1/60 spray and ½/60 spray.

Trials were also conducted to ascertain as precisely as possible the effect of the spray on the more resistant weed species. As far as possible, centres were selected where one of these weeds predominated. Four different concentrations of the spray were tested : 1, 2, 3 and 4 gallons each in 100 gallons of water per acre. These rates of application are referred to in this report as 1%, 2%, 3% and 4% sprays.

The sprays were applied in May or June in nearly all cases, but were delayed until July at a small number of centres. The weather was fine at

the majority of the centres on the day the spray was applied. At some centres there were light showers while the sprays were being applied, but this did not appear to affect adversely the efficacy of the spray. Reports from a relatively small number of centres indicated that heavy showers shortly after application of the spray reduced its effectiveness to some extent. The reduction however was not serious. Heavy rain, 24 hours after application, did not impede the effectiveness in any way, and some reports even indicate that the beneficial effects of the spray were accelerated by such rain. Cold seemed to delay the effects of the spray.

In the case of the concentrations applied against Brassica species, a check to the cereal was reported in 7 out of 105 reports on wheat; 11 out of 57 reports on oat crops and 4 out of 19 reports on barley crops. Such check as was noticed was of little consequence, consisting mainly of a slight yellowing of the leaves, and browning of the leaf tips. The crop invariably recovered in 4–14 days. Reports from 21 centres indicated that the spray had a stimulating effect on the wheat crop, and resulted in a richer green foliage, and in a couple of instances, longer straw. Similar reports in the case of oats were received from two centres.

With the concentrations applied against weeds of species other than Brassica, a check to the cereal was reported in 50 out of 102 reports on wheat crops, 24 out of 57 reports on oat crops and 4 out of 7 reports on barley crops. As with the Brassica sprays, the damage was insignificant, and the crop recovered quickly and produced a normal yield. At 1 centre where the spray was applied at 4% strength as wheat was coming into ear, the crop was seriously checked. Any check caused, occurred mainly where the 3% and 4% sprays were applied. In only one instance did the 2% spray damage wheat.

Both Brassicas and other weeds were in various stages of growth when sprayed. Members of the Brassica Group were destroyed or seriously damaged by all concentrations of the spray at all stages from seedling to adult plant, but it was apparent in some instances that the plants were more resistant when they reached the late flowering or podding stage, and retained sufficient vitality to set seed. As may be seen from Table I, Wild Turnip showed a certain degree of resistance, especially to the lower concentrations.

There is little evidence from the trials to indicate that better control of any of the other species may be expected from spraying at any particular stage of growth. In the case of annuals, spraying in the early stages of growth proved generally more effective.

Tables I and II show the number of centres at which each of the weeds was affected as indicated. The description "checked in growth" includes

various degrees of injury from slight effects to severe discoloration or distortion. In many cases the extent of this damage was sufficient to prevent seeding, or to give the crops an advantage in growth which enabled them to keep the weeds suppressed. At a number of centres, however, where weeds were checked in growth, they recovered to different extents within various spaces of time and were not considered to have been satisfactorily controlled.

Charlock would appear to be amenable to control by concentrations as low as ½ in 100, but for complete control a concentration of 1 in 100 would appear to be most satisfactory. As previously stated, Wild Turnip showed a slight degree of resistance, especially to the lower concentrations. Wild Radish also would appear to require a concentration of not less than 1 in 100 for satisfactory control. The number of centres from which reports on Shepherd's Purse and Pennycress were received was insufficient to enable any definite conclusion to be reached regarding the degree of control which might be expected with the concentrations used. In the case of Pennycress control might be expected, even with the lower concentrations, if spraying were done during the early stages of growth. The plant is more resistant when it reaches the late flowering or podding stage.

In the case of weeds other than Brassicas the results from the 1% spray were similar to those obtained in 1947, the weeds being destroyed at only a small number of centres. The 2% spray was, generally, more effective, while the 3% and 4% sprays gave highly promising results with most weeds.

The degree of control of vetches with all concentrations of the spray confirms the results obtained in 1947.

A satisfactory degree of control of Creeping Thistle and Dock appears to be possible, especially with the 3% and 4% sprays. While the 2% spray would appear to be about 50% effective against Creeping Thistle, it is much less effective against Dock, but considerably more effective than 1%. The 2% concentration, however, would appear to be capable of effecting a considerable check to Docks. It was almost equally effective as the 3% and 4% sprays in the preventing of seeding. Seeding was prevented in both Creeping Thistle and Dock in a number of instances with the 1% spray, but for satisfactory control a 3% or 4% spray would appear to be necessary. Even with a 4% spray there was incomplete destruction of Docks at 13 out of 29 centres.

Lambsquarter and Creeping Crowfoot were destroyed by the 3% and 4% sprays at all centres. The 1% and 2% sprays were also fairly effective against these weeds. Coltsfoot would appear to be highly resistant even to the 4% strength as it was not destroyed at any centre, although concentrations higher than 1% checked the weed at a number of centres.

The degree of control obtained against Corn Marigold was also slight, the weed being destroyed at only 2 centres with the 3% spray and at 1 centre with the 4% spray. With the latter spray, however, seeding was prevented at 3 centres.

Cleavers, Bishopweed, Fumitory, Ragwort, Cow Parsnip and Iris were each sprayed at only a small number of centres, but the reports indicate that these weeds are resistant to the spray even at the 4% strength.

Corn Spurry and Chickweed, while amenable to some degree of control by the 3% and 4% sprays, would appear to be highly resistant to the 1% concentration, and only slightly less so to the 2%. The results obtained against Hemp Nettle and Silverweed indicate a fair degree of control with the 3% and 4% sprays. Poppies and Knotgrass would also appear to be resistant, although both species were checked at a high proportion of centres by all concentrations. The results obtained against Redshank were similar to those obtained in 1947, the weed being destroyed by the 3% and 4% sprays at upwards of half the centres, and severely checked at practically all of the remainder.

Speedwell and Sorrel would appear to be amenable to control by the 2% spray. At one centre Yellow Rattle was destroyed by 1% and 2% sprays.

The following table shows the number of centres at which the perennating organs of the weeds were affected as indicated.

	Decayed or considerably damaged				Less severely but appreciably damaged				Slightly damaged				Unaffected				No. of Centres examined			
	1%	2%	3%	4%	1%	2%	3%	4%	1%	2%	3%	4%	1%	2%	3%	4%	1%	2%	3%	4%
Creeping Thistle	10	11	20	21	5	12	8	7	6	8	4	3	11	7	3	3	32	38	35	34
Dock	2	5	9	10	4	6	7	7	4	5	4	3	10	7	3	2	20	23	23	22
Coltsfoot ...	—	—	—	—	—	—	—	—	1	1	1	2	6	6	6	5	7	7	7	7
Stinging Nettle	—	—	1	1	1	—	—	—	1	1	1	1	—	—	—	—	2	1	2	2
Creeping Crowfoot	2	3	3	3	1	—	—	—	—	—	—	—	—	—	—	—	3	3	3	3
Silverweed ...	1	1	1	1	1	1	1	1	1	1	1	1	—	—	—	—	3	3	3	3

The sprays, particularly the 3% and 4% concentrations, caused considerable damage to the roots of Docks and the rhizomes of Creeping Thistle. The type of damage varied from a rot extending right through the core of the root to a blackening twisting and gnarling effect. With the weaker concentrations in the case of thistle the rotting affected only the crown of the rhizome in some instances. New buds were formed on the healthy portions. The rhizomes of Coltsfoot were only slightly damaged even by the 4% spray at a small number of centres, being unaffected at the majority.

It was mentioned in a few instances that where Creeping Thistle had been treated in 1947, surviving plants made much weaker growth in 1948.

In the case of Brassica species, the general effect on the root system was to render the roots dry and brittle, so that they broke cleanly. A somewhat similar effect was noticed in the case of the rhizomes of Horsetail treated with 1%, 2%, 3% and 4% sprays.

SUMMARY.

The results of the trials show that Brassica species, with the possible exception of Shepherd's Purse, may be controlled by concentrations of the spray as low as ½ in 100, but for complete control a concentration of 1 in 100 is desirable. The efficacy of the spray is unlikely to be impaired by rain shortly after application, but more rapid results might be expected when applications are made during warm sunny weather. The weeds were destroyed by the sprays when applied at various stages of growth, but appeared to be slightly more resistant when they reached the late flowering or podding stage. In order to eliminate competition with the crop, spraying in the early seedling stage is advisable.

While results with other weed species were somewhat erratic, a number would appear to be amenable to a considerable degree of control by the spray. These include Creeping Thistle, Dock, Vetches, Redshank, Hemp-nettles, Creeping Crowfoot, Yellow Rattle, Lambsquarter and possibly Silverweed, Corn Spurrey, Chickweed and Nettles. Poppies, Fumitory and Knotgrass would appear to be more resistant to the sprays, while Coltsfoot, Bishopweed, Comfrey, Cleavers and Corn Marigold were highly resistant. With most of these species, appreciably better results were obtained with 2%, 3% or 4% sprays than with 1%, a result which agrees with the reports for 1947.

The destructive effects of the sprays, especially at the higher concentrations, extend to a considerable degree to the underground perennating organs of some perennial weeds, more especially those whose aerial portions are subject to control.

While the spray, particularly at the 3% and 4% strengths, caused a check to the cereal, the effect was not such as would preclude the use of the spray at these concentrations on weed infested crops.

While at some centres the efficacy of the spray was reduced by heavy rain shortly after application, light or moderate showers on the date of spraying do not appear to impair the efficiency to any appreciable extent.

TABLE I.

Brassica Species

Name	1 in 100				½ in 100				1 in 60				½ in 60			
	No. of centres applied	Unaffected	Checked	Overground organs destroyed	No. of centres applied	Unaffected	Checked	Overground organs destroyed	No. of centres applied	Unaffected	Checked	Overground organs destroyed	No. of centres applied	Unaffected	Checked	Overground organs destroyed
Charlock ..	164	—	5	159	158	—	18	140	156	—	7	149	152	—	13	139
Wild Turnip ..	31	2	5	24	27	4	6	17	28	2	5	21	26	3	3	20
Wild Radish ..	11	—	2	9	6	1	2	3	7	—	1	6	5	—	3	2
Shepherd's Purse	—	—	—	—	1	1	—	—	2	—	2	—	—	—	—	—
Pennycress ..	2	—	1	1	2	—	1	1	2	—	1	1	2	—	1	1

TABLE II.

Other Species.

Name	1%				2%				3%				4%			
	No. of centres applied	Unaffected	Checked	Overground organs destroyed	No. of centres applied	Unaffected	Checked	Overground organs destroyed	No. of centres applied	Unaffected	Checked	Overground organs destroyed	No. of centres applied	Unaffected	Checked	Overground organs destroyed
Corn Spurrey	21	6	15	—	20	4	14	2	19	—	11	8	19	—	10	9
Hempnettles ..	14	3	9	2	17	1	8	8	10	—	4	6	13	—	2	11
Creeping Thistle	50	3	40	7	53	1	28	24	49	1	9	39	46	1	5	40
Docks	29	2	25	2	32	1	23	8	29	—	14	15	29	—	13	16
Crowfoot ..	10	—	6	4	9	—	5	4	4	—	—	4	6	—	—	6
Bindweed ..	—	—	—	—	1	1	—	—	1	1	—	—	2	1	—	1
Coltsfoot ..	17	16	1	—	17	10	7	—	13	5	8	—	15	4	11	—
Nettle	4	1	1	2	3	—	1	2	5	—	3	2	5	—	1	4
Vetches ..	18	1	8	9	18	—	7	11	17	—	4	13	14	—	3	11
Chickweed ..	12	4	7	1	13	4	7	2	10	—	8	2	9	—	5	4
Silverweed ..	15	2	5	8	8	2	2	4	9	—	2	7	7	—	2	5
Redshank ..	29	15	13	1	29	8	13	8	22	4	11	7	24	2	11	11
Plantain ..	1	—	1	—	3	—	3	—	—	—	—	—	—	—	—	—
Fumitory ..	3	3	—	—	4	3	1	—	1	—	1	—	1	—	1	—
Corn Marigold	10	6	4	—	9	5	4	—	11	5	4	2	9	3	5	1
Poppies ..	7	2	4	1	6	1	5	—	5	4	1	—	4	—	3	1
Cleavers ..	2	2	—	—	1	1	—	—	1	1	—	—	1	1	—	—
Horsetail ..	1	—	1	—	1	—	1	—	3	—	2	1	3	—	2	1
Lambsquarter	9	1	3	5	6	—	4	2	5	—	—	5	7	—	—	7
Knapweed ..	1	—	1	—	1	—	1	—	1	—	1	—	1	—	—	1
Marsh Wound-wort	—	—	—	—	—	—	—	—	1	—	1	—	—	—	—	—
Iris	1	1	—	—	1	1	—	—	1	1	—	—	1	—	1	—
Knotgrass ..	3	2	1	—	5	4	1	—	4	2	2	—	3	—	2	1
Ragwort ..	1	1	—	—	1	1	—	—	1	—	1	—	1	—	1	—
Bishopweed ..	2	2	—	—	2	2	—	—	2	2	—	—	2	2	—	—
Speedwell ..	1	—	1	—	2	—	—	2	—	—	—	—	—	—	—	—
Dandelion ..	—	—	—	—	1	—	1	—	—	—	—	—	—	—	—	—
Sorrel	2	—	1	1	1	—	—	1	—	—	—	—	—	—	—	—
Comfrey ..	2	—	2	—	2	—	2	—	2	—	2	—	2	—	2	—
Yellow Rattle	1	—	—	1	1	—	—	1	—	—	—	—	—	—	—	—
Cow Parsnip ..	1	1	—	—	1	1	—	—	1	1	—	—	1	1	—	—

REPORT OF THE SEED PROPAGATION DIVISION, 1948

The work of the Seed Propagation Division for the past year comprised :—

1. The propagation and distribution of pedigree seed of barley, wheat, and oats.

2. The inspection of barley extension crops grown from such seed.

3. The maintenance of pure lines of various varieties of barley and linseed.

4. The breeding, selection and propagation of new varieties of barley.

5. The testing of barley varieties.

The barley work was done in collaboration with Messrs. A. Guinness, Son & Co. Ltd., at whose experimental maltings malting tests were made. The oat work was done in collaboration with the Plant Breeding Division of University College, Dublin, which provides the Department with nucleus stocks. Except where otherwise stated in the report, the work was done at the Department's Cereal Station, Ballinacurra, Co. Cork, and the cultivations and experiments were made on the farm of Messrs. J. H. Bennett, Ltd., on which the Cereal Station is located.

METHOD OF PEDIGREE SEED PROPAGATION.

The following, as well as giving non-technical explanations of certain terms used in the report, gives an account of the method used in the production of pedigree seed of cereals.

Pure Line.—A pure line of a variety consists of a few hundred plants known to have descended with unaltered constitution from the original or foundation plant of the variety. Its produce provides material for its own maintenance and for the building up of larger stocks if such are required.

Garden Plot.—Usually ten to twenty times larger than the pure line, it is used as the first step in the extension of a pure line or for growing small quantities of other material such as the produce of a new cross or selections therefrom. As well as providing material for further propagation and for

small scale trials, it acts as an observation plot in the case of new varieties, aiding a decision on their merits. Pure lines and garden plots are usually sown by dibbling single seeds at regular spaces thus making possible the separate examination of each plant.

Field Plot.—This is the second step in the building up of pure stocks from a pure line. It is seeded with the produce of a garden plot. Great care is taken to ensure the purity of its produce ; it never follows another corn crop ; frequent inspection is made during the growing season and threshing is done with a specially constructed, easily cleaned thresher.

First Pedigree Plot.—This is seeded with the produce of a field plot and is as carefully managed as the latter.

Second Pedigree Plots.—These, which are seeded with the produce of a first pedigree plot, bring the pedigree plot area of a variety up to about forty acres. The resources of the Cereal Station in non-stubble ground cannot meet this and farmers in the neighbourhood of Ballinacurra co-operate at this stage by growing the seed supplied them on clean ground and with care and isolation at every stage. They contract to grow, harvest and thresh the crop under the Department's supervision and to deliver the produce to the Cereal Station.

Only established varieties or those which have proved their value in trials are brought to the second pedigree stage. New varieties are dropped at any of the earlier stages of multiplication if they fail to pass the trials to which they are submitted at various stages.

In the case of Spratt-Archer barley special care, over and above that ordinarily employed, is taken to ensure the maintenance of a high standard of purity. Instead of a single pure line, twenty-five small pure lines are maintained, which, in extension, give twenty-five small garden plots. In order to detect any possible deterioration in any of these pure lines, malting tests are made every third year at the garden plot stage. Further to this precaution the produce of the field plot and of the second pedigree plot are compared each year for yield and malting quality in a Half-Drill Strip experiment.

FURTHER EXTENSION AND DISTRIBUTION.

The produce of second pedigree plots and also of like pedigree stocks raised by the Plant Breeding Division of University College Dublin are distributed through schemes operated by the Department, mainly to organizations who undertake to have them further increased and made available to growers when suitable bulks are attained. These seed propagation crops are

inspected by the County Instructors in Agriculture and officers of the Department in the case of barley and, in the case of other cereals, by qualified officers of the organizations concerned.

METHODS OF TESTING NEW VARIETIES.

As soon as a pound or so of seed of a new variety is available the variety can be tested in a small scale experiment. In this experiment each variety occupies a number of small plots—usually ten to fifteen. Experience has proved that with careful analysis of the data a valuable estimate can be made of the potential value of new selections.

When five or six stones of seed are available, experiments on a field scale, such as Drill or Half-Drill Strip experiments, can be undertaken. In these there are up to twenty or more plots of each variety under test, each the width, or half the width, of the corn drill and sixty to one hundred yards long. These experiments give very accurate information as to the relative merits of the varieties for the season and of the localities in which the experiments are conducted.

A variety emerging successfully from such trials, especially if tried on more than one occasion, merits inclusion in large scale experiments. These are conducted at various centres throughout the country, either directly by the Department or through the Instructors in Agriculture. A variety which proves its superiority in a series of large scale experiments is considered worthy of recommendation to growers and usually steps are taken to make pedigree seed of it available.

WEATHER CONDITIONS, 1948.

Though there was much rain in January (7.35 inches), there were seventeen hours of sunshine above the average for the month. The first half of February was wet and mild but a dry cold spell with ground frost and snow set in at the middle of the month. The weather in March was good with temperatures and sunshine much above average. In April the weather was sunny but "broken" while the end of the month was cold with occasional hail showers. The first three weeks of May were warm, sunny and rainless but the remainder of the month was harsh and cold with much hail.

Unsettled, close, overcast weather with frequent showers and poor drying conditions prevailed during June and July. The weather was good from the end of July to the 20th August when a south-westerly storm accompanied by much rain developed. This was followed by very unsettled conditions which lasted until mid-September. Mild weather prevailed until the 8th

October when heavy rain caused extensive flooding. The remainder of the month was changeable, being rainy and cold.

November was damp and humid. The first fortnight of December was mild but very wet. A cold dry easterly spell began in the middle of the month and lasted until Christmas. There was much heavy rain at the end.of December which caused very extensive flooding.

BARLEY CULTIVATIONS.

Pure Lines:

Spratt-Archer 37 No. 3, Spratt-Archer 37 No. 4, Spratt-Archer 37/6, Spratt-Archer 37/6 No. 7, Spratt-Archer 37/6/3, Hume's Archer 1, Hume's Archer 2, Archer Goldthorpe 4/5/1, Spratt, Archer, Goldthorpe, Old Irish, Burton Malting, Victory, Binder, Plumage Archer, Plumage, Hybrid No. 7, Black Himalayan, Kenia, Naked Barley, Golden Archer 1, Golden Archer 2, Gold, Goldberg, Goldberg 2, Glabron, Pearl, Donegal 6-rowed, July 6-rowed, Beaven's F 112, Beaven's 49/14/3, B.244, Ymer, Freja, Maja, Camton, Balder, Rigel, Beaven's 54/13/3, Pioneer, Wong, Hordeum deficiens No. 16, Hordeum deficiens No. 16 x Irish Archer.

Garden Plots:

Spratt-Archer x Archer 26.
Spratt-Archer x Archer 38.
Spratt-Archer x Archer 34.
Spratt-Archer x Archer 45.
Spratt-Archer x Archer 61.
Spratt-Archer x Archer 65.
Spratt-Archer x Archer 72.
Spratt-Archer x Archer 73.
Spratt-Archer x Spratt 31.
Spratt-Archer x Spratt 13.
Spratt-Archer x Spratt 16.
Spratt-Archer x Spratt 17.
Spratt-Archer x Spratt 25.
Spratt x Archer 1.
Spratt x Archer 88.
Spratt x Archer 94.
Spratt-Archer x Archer.
Spratt-Archer.
Spratt-Archer x Kenia.
Spratt-Archer x Kenia 17.
Spratt-Archer x Kenia 22.
Spratt-Archer 37 No. 3 (25 single lines).
Spratt-Archer 37 No. 3 (25 ears: Bag Malting).
Spratt-Archer x Archer 14.
Spratt-Archer x Archer 20.

Garden Plots—(continued)

Spratt-Archer x Spratt 2.
(Hordeum deficiens 16 x Irish Archer) x Kenia (F. 3).
Spratt-Archer 37 No. 3 x Binder (F. 2).
Black Himalayan x Kenia (F. 2).
Earl (Hunter).
Hume's Archer 1.
Hume's Archer 2.
Binder.
Kenia.
Balder.
Rigel.
Ymer.
Freja.

Field Plots :

Kenia.
Ymer.
Rigel.
Freja.
Balder.
Binder.
Spratt x Archer (F. 6).
Spratt-Archer x Archer (F. 6).
Spratt-Archer x Spratt (F. 6).
Spratt-Archer x Kenia (F. 6).
Hume's Archer 1.
Hume's Archer 2.
Spratt-Archer 37 No. 3.

First Pedigree Plots :

Spratt-Archer 37 No. 3	4 acres.
Binder	2 ,,
Kenia	1 ,,
Hume's Archer 1	1 ,,
Spratt-Archer x Archer 14	1 ,,
Spratt-Archer x Archer 20	$\frac{2}{3}$,,
Balder	$1\frac{1}{2}$,,
Kenia x Spratt-Archer x Kenia 6/3 No. 5	1 ,,

Second Pedigree Plots :

Grown under contract by farmers in the neighbourhood of Ballinacurra under the Department's supervision.

Spratt-Archer 37 No. 3	42 acres.
Ymer	$9\frac{1}{2}$,,
Freja	8 ,,

EXTENSION AND DISTRIBUTION OF PEDIGREE SEED BARLEY.

Under the scheme for the distribution of pedigree seed 202 barrels of Spratt-Archer barley were distributed to the following members of the Irish Maltsters' Association who undertook to have the amounts they received further increased and made available to growers.

Messrs.	Minch, Norton & Co., Ltd., Athy	41 Brls.
,,	Minch, Norton & Co., Ltd., Nenagh	13 ,,
,,	P. O'Meara & Sons, Ltd., Thurles	5 ,,
,,	N. Hardy & Co., Ltd., 72 Park Street, Dundalk	5 ,,
,,	Cairnes Ltd., Drogheda	5 ,,
,,	J. Bolger & Co., Ltd., Ferns, Co. Wexford ..	5 ,,
,,	Beamish & Crawford, Ltd., Cork	5 ,,
,,	F. A. Waller & Co., Ltd., Banagher	12 ,,
,,	Geo. Read & Co., Ltd., Roscrea	10 ,,
,,	Joshua Watson & Co., Ltd., Carlow . ..	20 ,,
,,	W. J. O'Keeffe & Son, Wexford	10 ,,
,,	D. E. Williams, Ltd., Tullamore	2 ,,
,,	P. & H. Egan, Ltd., Tullamore	15 ,,
,,	J. & A. Tarleton, Ltd., Tullamore	10 ,,
,,	R. Gibney & Co., Ltd., Portlaoighise	10 ,,
,,	The North Tipperary Maltings, Ltd., Nenagh ..	10 ,,
,,	P. J. Roche & Sons, Ltd., Enniscorthy	10 ,,
Mr.	A. J. M. Reeves, Athgarvan Maltings, Co. Kildare ..	4 ,,
Messrs.	R. Perry & Son, Ltd., Rathdowney	5 ,,
,,	John Jameson & Sons, Ltd., Monasterevan ..	5 ,,
	Total	202 Brls.

Note.—All seed distributed under this scheme was treated with mercurial powder before despatch from Ballinacurra.

In addition to the foregoing, the following quantity of Seed Barley was also distributed :—

BINDER.

To the Agricultural School, Athenry, Co. Galway .. 9 Brls. 2 Sts.

INSPECTION OF BARLEY EXTENSION CROPS.

The 1948 extension crops of Spratt-Archer, the produce of seed issued from Ballinacurra in 1948 and in 1947, and some crops from the produce of earlier issues, now classed as commercial seed, were inspected before harvest

by Instructors in Agriculture and by officers of the Department. Reports indicating the probable suitability of these crops for seed purposes were made available to those co-operating in the Seed Barley Distribution Scheme. The following Table (TABLE I) contains a summary of the results of the inspections.

TABLE I.

Crops grown from	Acreage Inspected	Acreage Passed as Suitable for Seed	Acreage Rejected	Proportion Rejected
Seed ex Ballinacurra in 1948 ..	303	285	18	5.9%
Produce of Seed ex Ballinacurra in 1947	3,173	2,403	770	24.2%
Commercial Seed	3,556	2,119	1,437	40.4%
TOTALS ..	7,032	4,807	2,225	31.64%

The reasons for the rejections were :—

(*a*) Other barley crops having been grown without adequate isolation in the same field as the seed crops.

(*b*) Presence of an undue proportion of noxious weeds, wheat or oats.

(*c*) Grain of inferior quality.

It is desirable that firms co-operating in this scheme should exercise care in the selection of growers. From the number of crops rejected it is apparent that some distributors did not take sufficient care in this respect.

BARLEY EXPERIMENTS.

SMALL SCALE BARLEY VARIETY EXPERIMENT.

Seven new Cereal Station selections, a new Abed selection, Rigel, and the standard variety, Spratt-Archer 37 No. 8, were sown in a series of randomised blocks containing in all nine plots of each variety. Due, however, to an outbreak of Loose Smut (*Ustilago nuda*) occurring on Rigel, the nine plots of

this variety were removed from the experiment at the end of June. The list of the remaining varieties with the plot yields for each are set out in TABLE II.

Statistical examination of the results shows that the three selections Spratt x Archer 74, Spratt x Archer 91, and Spratt-Archer x Spratt 86 are each significantly inferior to the Standard variety, Spratt-Archer 87 No. 8. None of the other selections differs significantly from the Standard. Spratt-Archer x Archer 84 had the highest individual yield in the experiment but unfortunately its malt extract appears to be bad and this, if confirmed, may rule it out.

TABLE II.

Small Scale Barley Variety Experiment, 1948.

	Spratt-Archer x Archer 34	Spratt-Archer x Spratt 36	Spratt-Archer x Archer 23	Spratt x Archer 74	Spratt-Archer 37 No. 3	Spratt-Archer x Archer 30	Spratt x Archer 91	Spratt x Archer 77
	lb. ozs.	lb. ozs.	lb. ozs.	lb. ozs.	lb. ozs.	lb. ozs.	lb. ozs.	lb. ozs.
Block 1	7 1	6 6	6 7	5 15	6 2	7 0	5 8	6 8
,, 2	7 3	5 15	6 14	6 0	6 13	6 1	5 7	6 7
,, 3	6 4	5 12	5 10	5 3	6 3	5 14	5 9	6 4
,, 4	7 2	6 2	5 5	5 12	6 6	6 2	5 8	6 2
,, 5	6 3	5 15	5 9	5 12	6 7	5 14	5 6	6 2
,, 6	7 14	6 12	7 13	6 0	7 9	6 4	7 0	6 14
,, 7	7 4	6 3	7 0	7 9	7 7	6 8	7 6	7 9
,, 8	6 15	6 2	6 7	6 8	6 10	8 0	6 13	7 4
,, 9	6 1	5 12	6 9	6 9	6 14	6 11	6 8	4 7
TOTALS	61 15	54 15	57 10	55 4	60 7	58 6	55 1	57 9
Barrels, per acre	12.75	11.31	11.86	11.37	12.44	12.01	11.34	11.85
*Average Nitrogen per cent. ..	1.43	1.50	1.44	1.38	1.44	1.49	1.51	1.52
*Av. weight 1,000 corms (grms.) ..	38.4	34.7	35.1	35.6	34.0	36.9	34.0	35.4
Extract	124.9	125.7	127.1	131.1	132.1	126.3	125.4	127.8

*On dry matter.

HALF-DRILL STRIP EXPERIMENT.

In this experiment, which was conducted as a routine check on the purity of the Spratt-Archer stocks under propagation, the produce of the Second Pedigree plots was tested against that of the field plot. Each generation occupied twenty-two plots, a plot being a strip eighty-eight yards long and half the width of the corn drill wide. The plot yields from the experiment are given in TABLE III. These show the field plot generation to be superior to that of the second Pedigree.

TABLE III.

Barley Half-Drill Strip Experiment, 1948.

SPRATT-ARCHER 37 No. 3

Field Plot			2nd Pedigree		
Plot	sts.	lb.	Plot	sts.	lb.
a	2	5	B	1	11
C	2	3	b	2	1
c	2	6	D	2	3
E	2	9	d	2	4
e	2	8	F	2	6
G	2	5	f	2	3
g	2	4	H	2	7
I	2	6	h	2	7
i	2	8	J	2	5
K	2	3	j	2	5
k	2	2	L	1	9
M	1	12	l	2	1
m	2	3	N	1	12
P	1	11	n	2	0
p	1	10	Q	1	6
R	1	8	q	1	10
r	1	8	S	1	9
T	1	9	s	1	9
t	1	9	V	1	9
W	1	9	v	1	10
w	1	12	X	1	9
Y	1	10	x	1	9
TOTAL	45	6	TOTAL	43	5

*Average Nitrogen per cent. ..	1.17	*Average Nitrogen per cent.	1.20
*Average weight of 1,000 grains	30.0	*Average weight of 1,000 grains	31.0
Extract	131.8	Extract	132.7
Yield, Barrels, per acre ..	8.03	Yield, Barrels, per acre ..	7.64

*On dry matter.

DRILL STRIP EXPERIMENT No. 1.

There were four varieties, *viz.*, Ymer, Binder, Kenia x Spratt-Archer x Kenia 6/3 No. 5, and Spratt-Archer x Kenia 17 in this experiment.

YMER, a product of the Svalof Plant Breeding Institute, Sweden, is an early ripening variety with short strong straw highly resistant to lodging. On soils of suitable fertility it is capable of giving very high grain yields of good feeding quality.

BINDER, obtained from Denmark about twenty years ago, is also an early ripening and high yielding variety, but its straw is rather long and its resistance to lodging much less marked.

KENIA x ***SPRATT-ARCHER*** x ***KENIA*** 6/3 ***No.*** 5 is a new selection made by the Plant Breeding Division of University College, Dublin, from one of their recent crosses. Comparatively early in ripening, it possesses strong straw of medium length and is resistant to lodging.

SPRATT-ARCHER x ***KENIA*** 17 was bred at the Department's Cereal Station and, morphologically, is very similar to the last-named variety. It has a high malt extract combined with low grain nitrogen indicating high grade malting quality.

The experiment was laid out in a series of twelve randomised blocks, a block containing single plots of each of the four varieties. The plots were in the form of strips, sixty-six yards long and one corn drill-width wide. The separate plot yields of each variety are set out in tabular form in TABLE IV. Statistical examination of the yield figures shows that Ymer is significantly (1 per cent. level) superior to either of the other three varieties. The latter show no significant yield differences inter se.

TABLE IV.

Barley Drill Strip Experiment No. 1, 1948.

	Spratt-Archer x Kenia 17	Ymer	Kenia x Spratt-Archer x Kenia 6/3 No. 5	Binder
Block	sts. lb.	sts. lbs.	sts. lb.	sts. lb.
1 ..	4 4	4 4	4 5	4 5
2 ..	5 5	6 2	5 5	5 4
3 ..	4 12	5 11	5 1	4 12
4 ..	5 1	6 3	5 9	5 8
5 ..	5 3	6 2	5 5	5 3
6 ..	6 2	6 4	5 8	5 9
7 ..	6 0	7 1	6 2	6 1
8 ..	6 3	7 1	6 10	6 4
9 ..	5 11	6 3	6 2	5 6
10 ..	6 0	6 8	5 12	6 7
11 ..	6 6	7 3	6 13	6 9
12 ..	6 12	7 3	6 6	6 8
TOTALS ..	68 8	76 3	69 8	68 6
Barrels per acre	9.22	10.31	9.41	9.26
*Average Nitrogen per cent. ..	1.20	1.18	1.28	1.30
*Average weight 1,000 corms (grms.)	34.8	33.8	32.2	35.9
Extract	131.8	127.1	130.9	125.7

*On dry matter.

DRILL STRIP EXPERIMENT No. 2.

In this experiment two new hybrid selections, Spratt-Archer x Archer 14 and Spratt-Archer x Archer 20, bred at the Department's Cereal Station, were tried against Spratt-Archer 37 No. 3. Being of the Archer type they resemble the Standard very closely, but have the advantage of ripening some days earlier than the latter variety.

The experiment was laid out on similar lines to the last and the separate plot yields from each variety are given in TABLE V. These results show both Spratt-Archer x Archer 14 and Spratt-Archer x Archer 20 to be significantly superior (5 per cent. level) to the Standard in yielding capacity. The malting quality of both hybrids is very promising.

TABLE V.

Barley Drill Strip Experiment No. 2, 1948.

	Spratt-Archer 37 No. 3	Spratt-Archer x Archer 14	Spratt-Archer x Archer 20
Block	sts. lb.	sts. lb.	sts. lb.
1 ..	3 9	4 1	4 0
2 ..	4 7	4 10	4 6
3 ..	4 10	5 0	5 0
4 ..	4 10	4 12	5 0
5 ..	4 9	4 10	5 0
6 ..	4 11	4 13	5 1
7 ..	4 12	5 3	5 1
8 ..	4 12	5 1	5 0
9 ..	5 3	5 6	5 6
10 ..	5 2	5 8	5 10
11 ..	5 6	5 7	5 6
12 ..	5 6	4 11	5 9
TOTALS	57 13	59 12	60 11
Barrels per acre	7.47	7.72	7.84
*Average Nitrogen per cent. ..	1.19	1.18	1.18
*Average Weight 1,000 corns (grms.)	30.2	32.5	32.9
Extract	133	131.2	132.1

*On dry matter.

LARGE SCALE BARLEY VARIETY EXPERIMENT.

Experimental plots containing one statute acre of each of four varieties were laid down at ten centres throughout the malting barley areas of the country. The distribution of the centres together with the growers' names is given in TABLE VI. The four varieties included in the experiment were, Spratt-Archer 37 No. 3, Hume's Archer 1, Binder, and Balder. The seed used, with the exception of one variety, Balder, which was imported from Sweden direct, was the produce of First Pedigree Plots grown at the Cereal Station in 1947.

TABLE VI.

Large Scale Barley Variety Experiments, 1948.

Name and Address of Grower	Description of Soil	Previous Crops	Date of Sowing	Date of Harvesting*
1. Wm. Tait, Rostellan, Co. Cork.	Medium loam, subsoil shale	1946 : Beet 1947 . Wheat	20th March	10th August 14th August
2. M. P. Minch, Rockfield House, Athy, Co. Kildare	Deep loam, subsoil gravel	1946 : Barley 1947 : Roots	20th March	11th August 16th August
3. Wm. Mullins, Duninga House, Goresbridge, Co. Kilkenny.	Light loam, subsoil gravel and limestone	1946 : Barley 1947 : Roots	26th March	11th August 18th August
4. M. Carroll, Belleen, Nenagh, Co. Tipperary.	Medium loam subsoil limestone	1946 : Barley 1947 . Clover	26th March	16th August 21st August
5. Mrs. Segrave, Dunany, Dunleer, Co. Louth.	Medium loam, subsoil gravel and clay	1946 Wheat 1947 Swedes	24th March	20th August 27th August
6. E. P. Ruttledge, Ballyeighan, Birr, Co. Offaly.	Light loam, subsoil limestone	1946 . Rape 1947 Oats	30th March	12th August 20th August
7. D. O'Brien, Ballinamore, Tullamore, Co. Offaly.	Medium loam, subsoil limestone	1946 : Wheat 1947 : Oats and Mustard	30th March	26th August 28th August
8. Wm. Leacy (Junior), Cushinstown, New Ross, Co. Wexford	Deep loam, subsoil shale	1946 . Oats 1947 Roots	7th April	23rd August 28th August
9. P. Byrne, Ballygrangans, Kilmore, Co. Wexford.	Sandy loam, subsoil gravel	1946 Barley 1947 · Roots	8th April	21st August 23rd August
10. D. Morris, Tomahurra, Enniscorthy, Co. Wexford.	Shale loam, subsoil shale	1946 Barley 1947 · Turnips	15th April	20th August 24th August

*The earlier date in each instance relates to Binder and Balder.

Sowing conditions in the spring were very favourable and excepting two centres in Co. Wexford the plots were all sown in March. At all centres braird and early growth were satisfactory. At the Cork centre, lodging occurred in the plots of Hume's Archer 1 and Spratt-Archer 37 No. 3 with little detriment, however, to the yields. The season as a whole was much better than the 1947 one and, with the exception of two centres in Co. Offaly, the yields were good, ranging up to over 18 barrels per acre for the variety, Balder, at the Cork Centre.

The average results were as follows :—

	BARLEY				MALT	
Variety	Yield per Acre	Valuation per Barrel	Wt. of 1,000 Corns	Nitrogen	Extract	N. Lab. wort.
	Brls.	s. d.	Grms.	%		
Spratt-Archer 37 No. 3	9.56	50 6	30.4	1.36	129.1	.75
Hume's Archer 1 ..	10.08	50 7	31.1	1.33	130.4	.77
Binder	11.67	50 4	35.2	1.43	128.6	.82
Balder	10.60	50 4	30.8	1.40	128.6	.80

Binder is significantly (P = 0.01) superior to both Hume's Archer 1 and Spratt-Archer 37 No. 3 in yield. There is no significant difference between Balder and any of the other varieties. Hume's Archer 1 holds its position as a slightly superior form of the Spratt-Archer type.

Details of the results obtained at each centre are shown in TABLE VII.

TABLE VII.

Large Scale Barley Variety Experiments, 1948 ; Yield and Value of Grain per Statute Acre.

	SPRATT-ARCHER 37 No. 3				HUME'S ARCHER 1				BINDER				BALDER			
	Yield of		Value per Barrel	Total Value, including Screenings	Yield of		Value per Barrel	Total Value, including Screenings	Yield of		Value per Barrel	Total Value, including Screenings	Yield of		Value per Barrel	Total Value, including Screenings
	Dressed Grain	Screenings			Dressed Grain	Screenings			Dressed Grain	Screenings			Dressed Grain	Screenings		
	brls. st.	st.	s. d.	£ s. d.	brls. st.	st.	s. d.	£ s. d.	brls. st.	st.	s. d.	£ s. d.	brls. st.	st.	s. d.	£ s. d.
Cork: Wm. Tait ...	13 10	4	50 9	34 13 11	14 8½	4	50 8	36 17 6¾	16 13½	5	50 8	42 16 7	18 3	5½	50 5½	46 0 3½
Tipperary: M. Carroll ...	10 2	3½	50 9	25 16 3¼	9 7½	3½	50 9½	24 3 4½	10 14½	4½	50 6½	27 13 5¼	8 10½	3	50 6	21 18 2¼
Offaly: E. P. Ruttledge	5 9	3	50 4½	14 2 2	5 15½	2½	50 5	15 1 8¾	5 14½	2½	50 3½	14 17 7½	5 2½	2	50 2½	12 19 10¼
D. O'Brien ..	4 12½	5	49 7	11 18 10¾	5 3	4½	49 10	13 0 11¾	5 3½	4	49 7	13 0 6¼	4 3½	4	49 7	10 10 6¼
Kildare: M. P. Minch ...	10 11	3½	50 0½	25 15 10¾	10 2	3½	50 3½	25 10 11½	10 15	4	50 5½	27 13 10¾	11 9	4	50 6½	29 9 6¼
Kilkenny: W. Mullins ...	9 11	3	50 10	24 14 7½	10 10½	3	50 8½	27 2 6½	10 7	4½	50 6	26 8 8	9 4½	5	50 5	23 10 7¼
Wexford: Wm. Leacy ...	8 10½	2½	50 8½	22 0 4½	10 0½	3	50 9½	25 11 2¼	12 11	2	50 4½	31 19 10½	11 7	2½	50 4½	28 17 10¼
P. Byrne ...	10 7½	3	50 4½	26 8 10	11 9	3	50 6½	29 6 4	16 8½	3½	50 3½	41 13 9¾	11 5½	3	50 5¼	28 15 5
D. Morris ...	9 12	4	50 7	24 15 6½	10 1	4	50 7	25 11 5¼	12 0	4½	50 2½	30 4 1	11 3	4	50 3¼	28 5 1
Louth: Mrs. Segrave ..	12 3½	2	50 10½	31 3 3¾	12 10½	2	50 9½	32 3 4¼	15 4	3	50 6	38 12 3½	14 15½	2	50 7½	37 19 3
Average ...	9 8.9	3.35	50 6	24 4 11.8	10 0.4	3 30	50 6½	25 8 11.4	11 10 7	3.75	50 4	29 10 1	10 9.6	3.50	50 4	26 16 2

Screenings valued at 6d. per stone.

OATS.

Small Cultivations.

A pure line of Black Tartary and field plots of Sandy and Blantyre were grown at the Cereal Station.

Department's Extension Plots.

Victory II	35 acres.
Glasnevin Triumph	36 ,,

These were seeded with the produce of nucleus stocks received from the Plant Breeding Division of University College, Dublin, and were grown under contract by farmers in the neighbourhood of Ballinacurra under the supervision of the Department.

Distribution and Extension of Pedigree Seed.

Under the scheme for the distribution of Pedigree Seed, 176 barrels of Victory II, and 248 barrels of Glasnevin Triumph were distributed to the following on condition that these stocks would be further increased and made available to growers :—

	Victory II	*Glasnevin Triumph*
	Brls.	Brls.
Messrs. Pedigree Seed Growers, Ltd., 151, Thomas Street, Dublin ..	156	238
Messrs. J. H. Bennett, Ltd., Ballinacurra, Co. Cork	10	—
The Superintendent, Agricultural School, Athenry, Co. Galway ..	4	—
The Superintendent, Agricultural School, Ballyhaise, Co. Cavan ..	2	2
The Superintendent, Agricultural School, Clonakilty, Co. Cork ..	2	2
The Superintendent, Munster Institute, Cork	2	2
The Superintendent, Johnstown Castle, Agricultural College, Co. Wexford	—	2
Brownsbarn Farm, Clondalkin, Co. Dublin	—	2

The Plant Breeding Division, University College, Dublin, co-operated with the Department in the working of the scheme and distributed stocks as follows :—

GLASNEVIN TRIUMPH.

	Brls.	St.
Cereal Station, Ballinacurra, Midleton, Co. Cork	36	0
The Superintendent, Agricultural School, Athenry, Co. Galway	—	8
The Superintendent, Agricultural School, Ballyhaise, Co. Cavan	—	8
The Superintendent, Johnstown Castle Agricultural College, Co. Wexford	1	2
The Superintendent, Agricultural School, Clonakilty, Co. Cork	—	8

POTATO (ARDEE).

The Superintendent, Agricultural School, Athenry, Co. Galway	5	3

VICTORY II.

Cereal Station, Ballinacurra, Midleton, Co. Cork	8	6

SUCCESS X.

Messrs. J. H. Bennett, Ltd., Ballinacurra, Midleton, Co. Cork	7	0

STAR.

The Superintendent, Agricultural School, Ballyhaise, Co. Cavan	—	8
The Superintendent, Agricultural School, Athenry, Co. Galway	—	8
The Superintendent, Johnstown Castle Agricultural College, Co. Wexford	4	8
The Superintendent, Agricultural School, Clonakilty, Co. Cork	—	8

GLASNEVIN ARDRI.

The Superintendent, Agricultural School, Ballyhaise, Co. Cavan	—	8
The Superintendent, Agricultural School, Athenry, Co. Galway	—	8
The Superintendent, Johnstown Castle Agricultural College, Co. Wexford	1	2
The Superintendent, Agricultural School, Clonakilty, Co. Cork	—	8

WHEAT.

The following varieties were propagated on the farm of Messrs. J. H. Bennett, Ltd., Ballinacurra, Midleton, Co. Cork.

First Pedigree Plots:

Extra Kolben II.
Red Marvel x Diamant No. 4.

Field Plots:

April Red x Atle 6/1.
April Red x Atle 7/9.
April Red x Atle 7/7.
April Red x Atle 7/2.

In co-operation with the Department, the Plant Breeding Division of University College, Dublin, distributed stocks as follows:—

PAJBJERG.

	Brls.	St.
The Superintendent, Munster Institute, Cork	—	16
The Superintendent, Agricultural School, Clonakilty, Co. Cork	—	16

IRONMASTER DESPREZ NO. 2.

	Brls.	St.
The Superintendent, Munster Institute, Cork	—	16
The Superintendent, Agricultural School, Clonakilty, Co. Cork	—	16

ATLE.

	Brls.	St.
Messrs. Pedigree Seed Growers, Ltd., 151 Thomas Street, Dublin	163	0

FLAX.

At the Cereal Station, Ballinacurra, garden plots of the following varieties were grown:—

Buda.
Rio.
Newlands.
Redwing.
Bison.
Argentine Linseed.
Concurrent.

FRUIT CROP REPORT, 1948

The 1948 apple crop was generally very disappointing except in some of the southern counties where yields not much below average were reported.

Good growing conditions encouraged the early development and profuse flowering of top fruits, but heavy frost on 23rd and 26th May did considerable damage. Poor weather throughout the summer and autumn affected adversely the quality of the fruit, causing cracking and russeting of the skin in the case of apples.

The pear crop was bad in most areas as were also the plum and damson crops.

Of the soft fruits, gooseberries and black currants produced excellent crops, while strawberries, raspberries and loganberries were well up to average.

Weather Conditions: The year opened with a month of unusually heavy rainfall but temperatures in the main were rather high. Soil conditions generally were suitable for fruit tree planting. There was a slight fall of snow during the third week of January but this did not hold up outdoor operations unduly.

Weather conditions remained broken during the first half of February. A gale of unusual severity was experienced on the 8th of the month but little damage was caused to the leafless trees except in exposed sites. The remainder of the month was mainly dry with sharp east winds, and in most cases it was possible to have winter spraying completed according to schedule before any sign of bud movement had occurred.

Long spells of brilliant sunshine were experienced during March; in fact the weather was the best for that month for many years. Growth was rapid and blossom promise excellent.

April was also a month of unusually bright and mild weather with some frosts occurring during the closing weeks.

Cool wet weather prevailed during the first week of May followed by a long spell of bright dry conditions with frost on the nights of the 23rd, 24th and 26th.

These periods of low temperature coincided with the blossoming or setting periods of some kinds of fruits, notably apples, pears, plums and damsons, and were mainly responsible for the production of crops below normal in many areas.

Weather was mainly dull and unseasonable during June and up to the 25th July when a spell of dry weather with brilliant sunshine set in. This was followed by broken weather and heavy rains which continued up to the third week of September when a week of dry weather was experienced. Such conditions were not conducive to the production of first quality apples and were reflected in the russeting, cracking and other skin blemishes present at harvesting.

The opening week of October was mainly dry and mild and was followed by a fortnight of broken showery weather. The closing days of the month remained dry and cold with heavy night frosts. Harvesting operations were concluded during periods of calm weather, and generally without undue loss in the form of windfall fruit.

November was mild, though broken weather with heavy rainfall occurred during the third week. December weather was freakish, consisting of brilliant sunshine, frost, thunder and lightning accompanied by torrential rain and a fall of snow during the closing days of the month.

Diseases and Pests: Where routine spraying with winter washes was carried out there was very little trouble experienced so far as pests were concerned. Red Spider, however, appeared to be more in evidence than usual, especially in the drier districts and in orchards where lime sulphur was not used for control of apple scab.

Prolonged periods of unsettled sunless weather induced the spread of apple and pear scab and rendered application of spray difficult.

Although American gooseberry mildew and sawfly caterpillars caused some loss the crop was harvested in very good condition. Botrytis was responsible for some loss in the strawberry crop but not to the same extent as in 1946.

Table Showing in a General Way the Nature of the Yields Obtained in Each County

County	Gooseberries	Strawberries	Raspberries	Loganberries	Red and White Currants	Black Currants	Apples	Pears	Plums	Damsons
Carlow ...	Good	Good	Very Good	Very Good	Bad	Average	Average	Good	Bad	Bad
Cavan	Good	Good	Under Average	Under Average	Average	Under Average	Very Bad	Bad	Bad	Bad
Clare	Average	Bad	Average	Average	Average	Good	Below Average	Below Average	Bad	Very Bad
Cork	Good	Good	Good	Good	Average	Good	Good	Bad	Very Bad	Bad
Donegal ...	Below Average	Good	Average	Average	Average	Good	Average	Good	Bad	Bad
Dublin ...	Very Good	Good	Good	Good	Good	Below Average	Below Average	Good	Good	Good
Galway ...	Good	Average	Good	Good	Good	Good	Bad	Good	Bad	—
Kerry	Good	Good	Good	Good	Bad	Very Good	Bad	Very Bad	Very Bad	—
Kildare ...	Very Bad	Good	Good	Good	Good	Very Good	Bad	Good	Good	Good
Kilkenny ...	Average	Good	Average	Good	Good	Very Good	Average	Below Average	Bad	Bad
Laoighis ...	Good	Good	Very Good	Good	Very Good	Very Good	Very Bad	Average	Average	Bad
Leitrim ...	Average	Good	Good	Good	Average	Good	Very Bad	Average	Very Bad	Very Bad
Limerick ...	Good	Very Good	Average	Average	Good	Very Good	Bad	Below Average	Bad	Bad
Longford ...	Very Good	Good	Good	Good	Good	Good	Bad	Below Average	Average	Average
Louth	Good	Average	Good	Average	Average	Very Good	Bad	Below Average	Bad	Very Bad
Mayo	Good	Good	Good	Good	Average	Good	Bad	Bad	Bad	Bad
Meath	Good	Good	Good	Very Good	Good	Good	Bad	Average	Average	Good
Monaghan .	Good	Bad	Good	Good	Below Average	Below Average	Bad	Below Average	Below Average	Bad
Offaly	Good	Good	Below Average	Good	Good	Good	Very Bad	Average	Bad	Bad
Roscommon ..	Average	Bad	Bad	Average	Below Average	Average	Below Average	Below Average	Bad	—
Sligo	Average	Good	Good	Average	Average	Good	Very Bad	Bad	Bad	Bad
Tipperary N.R.	Very Good	Good	Good	Good	Good	Good	Bad	Bad	Average	Bad
Tipperary S.R.	Good	Good	Good	Good	Good	Below Average	Below Average	Below Average	Bad	Bad
Waterford .	Very Good	Good	Very Good	Good	Good	Good	Bad	Bad	Very Bad	Bad
Westmeath .	Very Good	Good	Very Good	Good	Very Good	Very Good	Below Average	Below Average	Below Average	Good
Wexford ...	Good	Good	Good	Very Good	Average	Good	Bad	Very Bad	Very Bad	Very Bad
Wicklow ..	Good	Good	Good	Good	Good	Good	Bad	Bad	Bad	Bad

DUBLIN MARKET.

Periods during which the various fruits were on offer in commercial quantities.

Apples : from 20th July onwards.

Plums : 18th July to 30th September.

Damsons : 10th September to 30th September.

Gooseberries : 1st May to 30th July.

Strawberries : 28th May to 30th July.

Raspberries : 25th June to 25th August.

Loganberries : 25th June to 25th August.

Black Currants : 22nd June to 30th July.

MARKET PRICES.

APPLES :

Dessert Varieties :	Early	5/– to 14/– per stone.
,, ,,	Mid-season, ...	5/– to 12/– ,,
,, ,,	Late ,, ...	5/– to 16/– ,,
Culinary Varieties :	Early	8/– to 10/– ,,
,, ,,	Mid-season	2/– to 7/6 ,,
,, ,,	Late ,, ...	2/– to 6/– ,,

Culls and crab apples for manufacturing purposes 9/– to 12/– per cwt.

PLUMS :

14/– to 20/– per 12 lb. chip ; Victorias 30/– to 42/– per chip ;
Jam Fruit 28/– to 36/– per cwt. ; Victorias 56/– per cwt.

DAMSONS :

8/– to 10/– per chip.
Jam Fruit 40/– per cwt.

GOOSEBERRIES :

6/- to 12/- per chip.
Jam Fruit 56/- per cwt.

STRAWBERRIES :

3/- to 6/- per lb. for early arrivals.
Later 1/6 to 2/6 and up to 3/6 per lb.
Jam Fruit 88/8 to 112/- per cwt.

RASPBERRIES :

1/3 to 1/9 per lb.
Jam Fruit 88/8 to 112/- per cwt.

LOGANBERRIES :

1/3 to 1/6 per lb.
Jam Fruit 65/4 per cwt.

BLACK CURRANTS :

10d. to 1/4 per lb.
Jam Fruit 93/4 per cwt.

RED AND WHITE CURRANTS :

8d. to 10d. per lb.
Jam Fruit 65/4 per cwt.

BLACKBERRIES :

24/- to 35/- per cwt.

BILBERRIES :

64/- to 112/- per cwt.

AN ROINN TALMHAÍOCHTA

(Department of Agriculture.)

Report on

NATIONAL

Egg-Laying Test

1948-1949

Reprinted from the JOURNAL *of the Department of Agriculture, Dublin, Vol. XLVII.*, 1950.

Pen No. 14 (White Wyandotte), owned by Mr. J. Lynch, Cooldoney, Abbeylara, Co. Longford, which won the Silver Cup.

NATIONAL EGG-LAYING TEST, 1948-49.

The Thirty-seventh Egg-Laying Test, conducted by the Department of Agriculture, was held at the Munster Institute, Cork, during a period of 46 weeks, beginning on 1st October, 1948, and ending on 18th August, 1949. A total of 95 pens, each consisting of six pullets, having fulfilled the required conditions, was accepted and arranged in Sections as follows:—

Section I.—White Wyandotte	8 pens
Section II.—White Wyandotte (confined to holders of Hen or Hen and Duck Stations in 1948)	7 ,,
Section III.—Rhode Island Red	30 ,,
Section IV.—Rhode Island Red (confined to holders of Hen or Hen and Duck Stations in 1948)	27 ,,
Section V.—Any non-sitting breed	7 ,,
Section VI.—Any other utility breed	16 ,,

Station holders were, as heretofore, allowed to enter a second pen in one of the open sections.

Only pullets which were certified by the Veterinary College, Ballsbridge, Dublin, as being non-reactors to the agglutination test for bacillary white diarrhoea were accepted.

Minimum Weights. The following were the prescribed minimum weights for the respective breeds at the start of the test:—

All non-sitting breeds ..	3 lb.
White Wyandotte	4½ lb.
Rhode Island Red	4½ lb.
Plymouth Rocks	5 lb.
Sussex	5 lb.
Any other sitting breed ..	5 lb.

Eggs were graded as follows :—

Egg Grades.

Special Grade.—$2\frac{1}{8}$ozs. and over for the first eight weeks (1st October to 25th November inclusive), $2\frac{1}{4}$ ozs. and over throughout the remainder of the test.

First Grade.—A minimum of $1\frac{15}{16}$ ozs. for the first eight weeks (1st October to 25th November, inclusive), and a minimum of 2 ozs. during the remainder of the test.

Eggs which weighed less than the weight prescribed for first grade were recorded but were not counted for scoring purposes.

System of Scoring.

The system of scoring for the award of prizes was as follows :—

(*a*) Only special and first-grade eggs were counted for scoring purposes.

(*b*) The scoring for each egg of these grades was similar and as follows :—

Three (3) points for the first 12 weeks (1st Oct. to 23rd Dec.).

Two (2) points for the next 24 weeks (24th Dec. to 9th June).

Three (3) points for the remaining 10 weeks (10th June to 18th August).

(*c*) Points were not awarded for eggs defective in colour, shape or shell texture, but all such eggs were included in the records of production.

Ineligibility for Section Prizes.

Section prizes were not awarded to pens which produced less than 900 scoring eggs nor special prizes to those laying less than 1,000 scoring eggs.

The following birds were not eligible for individual awards :—

(1) Birds that failed to complete the test.

(2) Birds that failed to pass the blood agglutination test for bacillary white diarrhœa at the conclusion of the test, and those showing breed or other defects considered undesirable in breeding stock.

(3) Birds that failed to reach, at the conclusion of the test, a body weight of half a pound over the minimum weight prescribed for the breed at the commencement of the test.

Egg Yields. Making no allowance for deaths, the average number of eggs per bird was 177.4. The average number of eggs per bird for which a record for the full 46-week period was available was 187.3 (see Table II). The corresponding figures in the previous test were 184.0 and 191.7 respectively. The average production per bird during each of the twelve periods for each breed is given in Table III.

Egg Size. Fourteen pens produced more than 20 per cent. of eggs under first grade.

Egg Weights. The average weight of egg for each of the competing breeds is shown in Table IV. The average weight per dozen eggs for all breeds was 26.4 oz., as compared with 27.0 oz. for the previous test. In Table V are given the number and percentage of the different grades of eggs for each breed in respect of birds which completed the full 46-week period.

Copper Rings. Of the 509 birds which completed the full 46-week period, 159 or 31.2 per cent. laid 200 or more special and first-grade eggs and not more than 20 per cent. under first grade. Of these, 136 were leg-banded with numbered sealed copper rings. Copper rings were withheld from the following 23 birds which were not suitable for breeding purposes :—

(*a*) Breed Standard Defects :—

8 White Wyandotte.
4 Rhode Island Red.

(*b*) Defective Eggs :—

1 White Wyandotte.

(*c*) Defective Eyes :—

8 White Wyandotte.
10 Rhode Island Red.
2 Light Sussex.

A total of 153 birds, representing 30.1 per cent. of the number surviving the full period of the test, laid over 169 but less than 200 special and first-grade eggs. Birds which laid more than 20 per cent. of eggs under first grade are not included in the foregoing total (see Table VII).

Mortality. During the period of the test 61 birds died, representing a mortality of 10.7 per cent., and an increase of 2.2 per cent. as compared with the previous test. The distribution of the total deaths amongst pens was as follows :—

1 pen	4 deaths.
4 pens	3 deaths each.
7 pens	2 deaths each.
31 pens	1 death each.

In the remaining 52 pens all birds completed the test. Table IX gives particulars of the birds that died and the cause of death in each case.

Almost 40 per cent. of the mortality was caused by peritonitis and oviductitis.

B.W.D. Test. At the conclusion of the test the birds were submitted to the agglutination test for bacillary white diarrhœa, and there was one reactor.

Feeding. The system of feeding was similar to that in previous tests. The birds were fed three times daily. The morning feed consisted of half the grain ration ; the mid-day feed of wet mash, and the evening feed of the remainder of the grain ration. Dry mash was fed *ad lib.* and was made up to the following formula :—

1	part	by	weight	Bran.
2	parts	,,	,,	Pollard.
2	,,	,,	,,	Oats.
3½	,,	,,	,,	Maize Meal.
1	part	,,	,,	Fish Meal.
½	,,	,,	,,	Dried Yeast.

The following quantities of foods were consumed :—

Mixed Meals	33,768 lbs.
Potatoes	10,408 ,,
Grain	28,072 ,,
Limestone Grit	1,904 ,,

NOTES ON COMPETING BREEDS.

WHITE WYANDOTTE.

Sections I and II. Of the fifteen pens in these Sections, two were under-developed on arrival and took some time to come into full production. These Sections generally consisted of birds of good quality. Egg production compared favourably with this breed in the previous test and with that from other breeds in the test under review. Egg size was satisfactory. Some birds produced eggs with poor shells. Mortality was higher than in the preceding test.

The winning pen, No. 14 in Section II, entered by Mr. J. Lynch, Cooldoney, Abbeylara, Co. Longford, also won the silver cup for the best pen in the test. This pen consisted of birds that were good specimens of the breed and produced 1,864 Special and First Grade scoring eggs during the 46 weeks. The best pullet in the test, No. 92, also came from this pen. She laid 267 Special and First Grade eggs.

RHODE ISLAND RED.

Sections III and IV. Fifty-seven pens were accepted in these Sections, four of them were backward on arrival at the test. Most of the pens were made up of birds that were good representatives of the breed. Egg yield was lower than in the preceding test and Winter egg production compared unfavourably with that from other breeds. Some hens gave a proportion of Second Grade eggs, otherwise egg size and quality were satisfactory. Mortality was higher than in previous tests.

ANY NON-SITTING BREED.

Section V. The seven pens of White Leghorns in this Section were fair specimens of the breed. Production was lower than in the previous test but egg size and quality were up to standard. Mortality was lower than in previous tests.

ANY OTHER UTILITY BREED.

Section VI. This Section consisted of fifteen pens of Light Sussex and one pen of Australorps. The Light Sussex generally were fair representatives of the breed : the Australorps were of good breed standard. Production in the Section was low. Egg size and quality were fairly satisfactory. Mortality, although higher than in the corresponding Section of the preceding test, was not as high as in other breeds in this test.

CONCLUSION.

The results of the test were satisfactory. Production was somewhat lower and mortality higher than in the preceding test. Winter production, particularly in Rhode Island Reds, was disappointing and this is a point to which attention should be devoted in the selection of breeding stock. Some competitors still send birds to the test that are either poor specimens of the breed or under-developed on arrival. Such birds are not likely to do credit to the breeders concerned and competitors would be well advised to pay greater attention to the selection of their birds.

TABLE I.

The following Table shows the egg production for each of the thirty-six tests held since 1912-13 :—

Test Period	No. of Birds	No. of Eggs Laid	Average Number per Bird
Forty-eight weeks ended :—			
31st Aug., 1913	318	38,199	120.1
„ 1914	282	39,216	139.0
„ 1915	264	39,764	150.6
„ 1916	294	49,830	169.5
„ 1917	210	36,660	174.6
„ 1918	210	36,106	171.9
„ 1919	306	55,124	180.0
„ 1920	354	65,840	186.0
„ 1921	288	51,584	179.0
9th Sept., 1922	342	63,518	185.7
16th „ 1923	198	38,519	194.5
15th „ 1924	342	61,144	178.8
15th „ 1925	348	63,755	183.2
15th „ 1926	342	65,137	190.4
16th „ 1927	492	93,912	190.9
16th „ 1928	510	95,226	186.7
16th „ 1929	540	101,820	188.6
16th „ 1930	588	100,752	171.3
16th „ 1931	588	111,180	189.1
15th „ 1932	600	111,986	186.6
12th „ 1933	606	113,047	186.5
10th „ 1934	606	112,177	185.1
7th „ 1935	702	131,384	187.1
3rd „ 1936	702	130,940	186.5
Forty-six weeks ended :—			
18th Aug., 1937	708	125,621	177.4
18th „ 1938	678	126,143	186.1
18th „ 1939	708	133,306	188.3
17th „ 1940	672	121,250	180.4
18th „ 1941	642	114,617	178.5
18th „ 1942	438	77,640	177.3
18th „ 1943	510	88,167	172.9
17th „ 1944	546	91,908	168.3
18th „ 1945	546	94,956	173.9
18th „ 1946	552	91,038	164.9
18th „ 1947	570	98,674	173.1
17th „ 1948	480	88,338	184.0
18th „ 1949	570	101,100	177.4

It should be noted that the figures given in Table I above are based on the total number of birds competing, no allowance having been made in respect of deaths.

Taking the birds which died during the 1948-49 test into account only up to the date of death, the average number of birds for the whole period was 548.3 and the average number of eggs per bird 184.4.

Table II.

Average Egg Yield for each Breed.

Breed	Number of Birds for full period	Number of Eggs Laid	Average Number of Eggs per Bird	Grade Averages per Bird: Special	First	Under First
White Wyandotte	74	14,616	197.5	106.3	76.5	14.7
Rhode Island Red ..	306	58,360	190.7	90.4	81.2	19.1
White Leghorn	40	7,654	191.4	110.4	69.7	11.3
Light Sussex	83	13,692	165.0	87.7	63.7	13.6
Australorp	6	993	165.5	148.7	16.8	—
All Breeds	509	95,315	187.3	94.5	76.0	16.8

Table III.

Average Egg Yield per Bird during each of the Twelve Periods.

Breed	Number of Birds for full period	Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Average for full period
White Wyandotte ...	74	12.5	17.0	17.6	16.5	17.6	19.6	21.1	19.7	17.1	16.3	15.5	7.0	197.5
Rhode Island Red ...	306	9.7	12.3	15.7	15.9	18.3	20.0	21.4	21.0	17.4	16.7	15.3	7.0	190.7
White Leghorn ...	40	11.9	12.4	12.5	13.4	17.5	19.3	21.2	21.1	19.4	18.2	17.5	7.0	191.4
Light Sussex ...	83	9.4	12.4	14.3	15.4	17.2	18.5	18.7	16.4	13.6	11.7	12.3	5.1	165.0
Australorp	6	4.0	4.6	8.8	10.7	10.2	19.5	23.5	24.8	19.0	14.7	17.0	8.7	165.5
All Breeds ...	509	10.1	12.9	15.4	15.6	17.8	19.7	20.9	20.1	16.9	15.9	15.0	7.0	187.3

Table IV.
Average Weight of Egg for each Breed.

Breed	Total Number of Eggs Laid	Total Weight of Eggs	Average Weight of Egg	Average Weight per dozen
		lb. oz. dr.	*oz. dr.*	oz.
White Wyandotte ..	16,202	2,286 5 14	2 3	26.5
Rhode Island Red ..	62,000	8,458 2 13	2 3	26.2
White Leghorn ..	7,748	1,083 2 9	2 4	26.8
Light Sussex	14,157	1,960 14 1	2 3	26.6
Australorp	993	147 9 11	2 6	28.5
All Breeds ..	101,100	13,886 3 0	2 3	26.4

Table V.
Number and Percentage of Special, First and under First Grade Eggs for each Breed in respect of Birds which completed the full 46-week Period.

Breed	Eggs Laid			Percentage Distribution		
	Special Grade	First Grade	Under First Grade	Special Grade	First Grade	Under First Grade
				%	%	%
White Wyandotte ..	7,864	5,660	1,092	53.8	38.7	7.5
Rhode Island Red ..	27,647	24,861	5,852	47.4	42.6	10.0
White Leghorn	4,416	2,787	451	57.7	36.4	5.9
Light Sussex	7,279	5,289	1,124	53.2	38.6	8.2
Australorp	892	101	—	89.8	10.2	—
All Breeds	48,098	38,698	8,519	50.5	40.6	8.9

TABLE VI.

Number and Percentage of Birds which laid 200 Special and First Grade Eggs or over, and not more than twenty per cent. under First Grade.

BREED	Number of Birds for full Period	Number of Birds which laid 200 Special and First Grade Eggs or over	Percentage
			%
White Wyandotte	74	31	41.9
Rhode Island Red	306	100	32.7
White Leghorn	40	14	35.0
Light Sussex	83	13	15.7
Australorp	6	1	16.7
All Breeds	509	159	31.2

TABLE VII.

Number and Percentage of Birds which laid over 169 but less than 200 Special and First Grade Eggs and not more than 20 per cent. under First Grade. The figures are based on the number of birds which completed the Test.

BREED	Number of Birds	Percentage
		%
White Wyandotte	22	29.7
Rhode Island Red	91	29.7
White Leghorn	13	32.5
Light Sussex	26	31.3
Australorp	1	16.7
All Breeds	153	30.1

TABLE VIII.

Egg Records of Birds which were awarded Copper Rings.

WHITE WYANDOTTE (24 Birds).

Pen Number	Bird Number	Number of Sealed Copper Ring	EGGS LAID				NAME AND ADDRESS OF OWNER
			Special Grade	First Grade	Under First Grade	Total	
2	19	3125	214	5	—	219	Mr. V. E. H. Bewley, Danum Firs, Zion Road, Rathgar, Dublin.
3	25 27	3126 3127	94 195	122 31	10 —	226 226	Mr. V. E. H. Bewley, Danum Firs, Zion Road, Rathgar, Dublin.
4	31	3128	116	89	3	208	Mrs. N. F. Forde, Corbally, Limerick.
5	39 40	3129 3130	177 44	40 172	2 7	219 223	Sister-in-Charge, St. Martha's College, An Uaimh, Co. Meath.
7	51 54	3131 3132	129 105	80 96	1 18	210 219	Mrs. M. Nagle, Sandfield, Mallow, Co. Cork.
10	68 70	3133 3134	203 133	2 93	— 4	205 230	Mrs. C. Monahan, Toor Cottage, Ballinabrackey, Hill-of-Down, Co. Meath.
11	73 75	3135 3136	191 25	9 234	— 17	200 276	Mrs. K. Ryan, Farnane, Lisnagry, Co. Limerick.
12	79 80 81 84	3137 3138 3139 3140	164 231 165 203	64 4 72 44	1 1 2 1	229 236 239 248	Miss M. Connolly, Carrigamore, Corvally P.O., Co. Monaghan.
13	90	3141	35	175	4	214	Mr. W. Barron, P.C., Woodview, Gurtrush, Piltown, Co. Kilkenny.
14	92 94 95 96	3254 3143 3144 3145	158 85 125 214	114 120 88 28	6 22 6 1	278 227 219 243	Mr. J. Lynch, Cooldoney, Abbeylara, Co. Longford.
15	97 98 102	3146 3147 3148	75 108 115	131 144 118	8 11 5	214 263 238	Mrs. W. Coleman, Banada, Ballaghaderreen, Co. Roscommon.

Rhode Island Red (86 Birds).

Pen Number	Bird Number	Number of Sealed Copper Ring	Eggs Laid Special Grade	First Grade	Under First Grade	Total	Name and Address of Owner
18	110	3149	225	17	1	243	Mr. D. H. Edwards,
	112	3150	181	72	1	254	Drumgowan,
							Burt,
							Co. Donegal.
19	116	3151	54	148	15	217	Mrs. M. Doyle,
	118	3152	84	118	1	203	Carrigeen,
							Baltinglass,
							Co. Wicklow.
25	139	3153	184	17	—	201	Mrs. M. McNamara,
	142	3154	64	168	9	241	Brook Lodge,
	144	3155	37	179	39	255	Kilmeedy,
							Co. Limerick.
26	145	3156	188	23	1	212	Mrs. A. P. Harris,
	146	3157	151	74	5	230	Athassel,
	147	3158	223	3	—	226	Golden,
	148	3159	188	24	3	215	Cashel,
							Co. Tipperary.
27	154	3160	154	48	3	205	Mrs. A. P. Harris,
							Athassel,
							Golden,
							Cashel,
							Co. Tipperary.
28	158	3161	60	155	3	218	Mrs. J. Hyde,
							Killeens Farm,
							Cork.
30	172	3162	147	57	—	204	Miss B. Walsh,
							Killountain,
							Bandon,
							Co. Cork.
31	175	3163	194	31	1	226	Rev. Bro. J. Edwards,
							Agricultural College,
							Mount Bellew,
							Co. Galway.
32	181	3164	54	186	3	243	Rev. Bro. J. J. Kelly,
	183	3165	193	47	—	240	Industrial School,
	185	3166	219	3	1	223	Artane,
							Co. Dublin.
33	192	3248	24	204	4	232	Miss M. O'Donovan,
							Dromore,
							Villierstown,
							Cappoquin,
							Co. Waterford.
37	207	3168	17	183	4	204	Rev. Bro. P. Regan, O.M.I.,
	210	3169	206	14	—	220	Our Lady of Lourdes,
							Cahermoyle,
							Ardagh,
							Co. Limerick.

Pen Number	Bird Number	Number of Sealed Copper Ring	Eggs Laid: Special Grade	Eggs Laid: First Grade	Eggs Laid: Under First Grade	Eggs Laid: Total	Name and Address of Owner
38	215	3170	32	179	16	227	Captain H. M. S. Redmond, Popefield, Athy, Co. Kildare.
40	228	3171	171	94	—	265	Sister-in-Charge, St. Martha's College, An Uaimh, Co. Meath.
41	232	3172	156	66	2	224	Miss J. Horsburgh, Swift Brook House, Saggart, Co. Dublin.
	233	3173	197	10	—	207	
42	236	3174	56	157	—	213	Mr. H. A. Earl, Grantstown House, Waterford.
	239	3175	155	53	3	211	
	240	3176	126	86	8	220	
43	243	3177	110	121	3	234	Mr. H. A. Earl, Grantstown House, Waterford.
44	247	3178	143	75	5	223	Mrs. K. Earl, Grantstown House, Waterford.
	248	3179	140	88	1	229	
	249	3180	211	3	—	214	
	250	3181	223	4	—	227	
	251	3182	180	44	1	225	
	252	3183	148	66	5	219	
46	262	3184	184	23	1	208	Mrs. C. Healy, Clonmeen, Banteer, Co. Cork.
	264	3185	194	15	—	209	
47	268	3186	45	167	3	215	Miss A. M. Dempster, Emo Park, Portarlington, Laoighis.
49	281	3188	30	184	29	243	Mrs. O. Hodgins, Roselawn, Cloughjordan, Co. Tipperary.
50	283	3189	50	170	5	225	Mrs. J. McCarthy, Caherelly Castle, Grange, Kilmallock, Co. Limerick.
	287	3190	123	100	3	226	
53	298	3191	55	157	6	218	Mr. M. McCarthy, Caherelly Castle, Grange, Kilmallock, Co. Limerick.
54	302	3192	33	187	12	232	Mrs. M. F. Smith, Bridge House, Bettystown, Co. Meath.
	303	3193	52	189	3	244	
	305	3194	55	145	8	208	
	306	3252	234	3	—	237	

Pen Number	Bird Number	Number of Sealed Copper Ring	Eggs Laid: Special Grade	First Grade	Under First Grade	Total	Name and Address of Owner
55	308	3196	220	1	—	221	Mr. D. H. Edwards, Drumgowan, Burt, Co. Donegal.
	311	3197	211	21	—	232	
	312	3198	222	1	—	223	
57	320	3199	10	205	20	235	Mrs. M. Doyle, Carrigeen, Baltinglass, Co. Wicklow.
	321	3200	230	16	—	246	
	323	3201	187	37	—	224	
58	325	3202	200	4	—	204	Mrs. M. A. Kelly, Carronstown, Ballivor, Co. Meath.
	327	3203	190	49	1	240	
	328	3204	205	6	—	211	
59	333	3205	67	162	2	231	Miss N. Moore, Churchtown, Churchland Quarters, Carndonagh, Co. Donegal.
	334	3206	115	93	5	213	
	336	3207	44	169	7	220	
60	340	3208	74	154	3	231	Mr. M. Fitzgibbon, Gurrane, Kilmeedy, Co. Limerick.
61	345	3209	12	189	7	208	Mrs. A. E. Edwards, Hillsboro' House, Ramelton, Co. Donegal.
	346	3210	61	176	2	239	
62	353	3211	216	2	—	218	Rev. Bro. P. Regan, O.M.I., Our Lady of Lourdes, Cahermoyle, Ardagh, Co. Limerick.
64	358	3212	188	31	—	219	Mrs. O. Hodgins, Roselawn, Cloughjordan, Co. Tipperary.
65	361	3213	206	48	—	254	Mrs. J. Hyde, Killeens Farm, Cork.
66	368	3214	58	160	5	227	Mrs. B. McAuliffe, Farrihy, Broadford, Charleville, Co. Limerick.
	369	3215	220	19	1	240	
67	376	3216	79	130	8	217	Mrs. J. Casey, Foxfort, Bansha, Co. Tipperary.

Pen Number	Bird Number	Number of Sealed Copper Ring	Eggs Laid: Special Grade	First Grade	Under First Grade	Total	Name and Address of Owner
68	381 383 384	3249 3250 3251	45 164 87	192 43 141	15 1 17	252 208 245	Miss M. O'Donovan, Dromore, Villierstown, Cappoquin, Co. Waterford.
72	394 396	3220 3221	45 99	187 141	6 14	238 254	Mrs. M. Kennedy, Kilderry House, Fedamore, Co. Limerick.
73	397 399	3222 3223	97 37	116 170	4 25	217 232	Mrs. D. Philpott, Charlesfield, Lyre, Banteer, Co. Cork.
75	411	3224	40	171	8	219	Mrs. E. McDonnell, Emila, Ballyferriter, Dingle, Co. Kerry.
78	429 431	3225 3226	11 34	198 175	18 8	227 217	Mrs. L. Hayes, Walshestown, Castlemahon, Newcastle West, Co. Limerick.
79	437 438	3227 3228	162 128	65 81	3 —	230 209	Miss M. Mulcahy, Abbeyview, Clonmel, Co. Waterford.
81	442	3229	60	171	4	235	Mrs. S. Collier, Boggan, Kilbride, Tullow, Co. Carlow.
82	447 450	3230 3231	154 105	53 123	— 2	207 230	Mrs. C. Healy, Clonmeen, Banteer, Co. Cork.
83	454 456	3232 3233	108 164	99 63	4 4	211 231	Miss C. Mealiff, Ballinamona House, Tullamore, Offaly.
84	550 551	3234 3235	67 123	148 92	6 1	221 216	Miss M. Murphy, Valley View House, Coolduv, Lissarda, Co. Cork.

WHITE LEGHORN (14 Birds).

Pen Number	Bird Number	Number of Sealed Copper Ring	Eggs Laid: Special Grade	Eggs Laid: First Grade	Eggs Laid: Under First Grade	Eggs Laid: Total	Name and Address of Owner
85	631 632 633 634	1858 1859 1860 1861	171 222 157 94	39 6 51 118	16 1 2 2	226 229 210 214	Mr. J. H. Malcolm, Caherleske, Callan, Co. Kilkenny.
86	638 640 642	1862 1863 1865	132 201 184	99 16 29	4 — —	235 217 213	Mrs. M. O'Shea, Farrantane, Castlegregory, Co. Kerry.
87	645 646	1866 1867	202 185	18 37	— —	220 222	Mrs. P. Walton, Ashtown Lodge, Castleknock, Co. Dublin.
89	655 656	1868 1869	148 194	79 39	— 2	227 235	Sister-in-Charge, St. Martha's College, An Uaimh, Co. Meath.
96	662 665 666	1870 1872 1873	96 28 188	136 175 19	13 38 —	245 241 207	Mrs. P. Collins, Pollinore, Corofin, Ballyglunin, Co. Galway.

LIGHT SUSSEX (11 Birds).

Pen Number	Bird Number	Number of Sealed Copper Ring	Eggs Laid: Special Grade	Eggs Laid: First Grade	Eggs Laid: Under First Grade	Eggs Laid: Total	Name and Address of Owner
102	465	3236	122	112	7	241	Mrs. C. MacDonald, Laharan, Minane Bridge, Co. Cork.
105	475	3237	79	125	2	206	Mrs. W. O'Neill, Killeen House, Ballybricken, Grange, Kilmallock, Co. Limerick.
108	495	3238	36	165	10	211	Sister-in-Charge, St. Martha's College, An Uaimh, Co. Meath.

Pen Number	Bird Number	Number of Sealed Copper Ring	Eggs Laid Special Grade	Eggs Laid First Grade	Eggs Laid Under First Grade	Eggs Laid Total	Name and Address of Owner
111	514 516	3239 3240	164 110	66 107	— 9	230 226	Mrs. M. Reeves, Knocksouna, Kilmallock, Co. Limerick.
112	518 520 521	3240 3242 3243	195 99 151	36 107 59	— 15 12	231 221 222	Mrs. M. Comerford, Lamogue, Windgap, Thomastown, Co. Kilkenny.
113	525 527	3244 3245	83 206	127 6	11 —	221 212	Mrs. M. Comerford, Lamogue, Windgap, Thomastown, Co. Kilkenny.
115	540	3246	73	140	3	216	Miss K. Taylor, Deermount, Lissarda, Co. Cork.

Australorp (1 Bird).

Pen Number	Bird Number	Number of Sealed Copper Ring	Eggs Laid Special Grade	Eggs Laid First Grade	Eggs Laid Under First Grade	Eggs Laid Total	Name and Address of Owner
117	544	3247	199	6	—	205	Mr. J. H. Malcolm, Cahirleske, Callan, Co. Kilkenny.

TABLE IX.

Results of post-mortem examinations performed by the Veterinary College.

Date of Death	Number of Bird	Number of Pen	Breed	Result of Port-mortem Examination
1948				
Oct. 14	235	42	Rhode Island Red	Impaction of the gizzard.
,, 29	364	65	Rhode Island Red	Visceral gout.
Nov. 2	408	74	Rhode Island Red	Enteritis.
,, 13	356	64	Rhode Island Red	Lymphomatosis of the liver and kidneys.
Dec. 6	557	116	Light Sussex	Peritonitis.
1949				
Jan. 3	85	13	White Wyandotte	Neuro-lymphomatosis.
,, 3	86	13	White Wyandotte	Lymphomatosis of the internal organs.
,, 5	386	70	Rhode Island Red	Heart disease.
,, 10	173	30	Rhode Island Red	Haemangiomata.
,, 11	556	116	Light Sussex	Peritonitis.
Feb. 14	120	19	Rhode Island Red	Lymphomatosis of the internal organs.
,, 16	468	102	Light Sussex	Lymphomatosis of the ovaries.
Mar. 1	409	75	Rhode Island Red	Lymphomatosis of the internal organs.
,, 5	33	4	White Wyandotte	Tape-worm infestation.
,, 14	87	13	White Wyandotte	Lymphomatosis of the ovaries.
,, 16	174	30	Rhode Island Red	Cause of death not apparent.
,, 21	654	88	White Leghorn	Peritonitis and oviductitis.
,, 21	419	76	Rhode Island Red	Tuberculosis.
,, 22	125	20	Rhode Island Red	Leukaemia of the liver.
,, 28	52	7	White Wyandotte	Tuberculosis.
April 1	282	49	Rhode Island Red	Tuberculosis.
,, 8	296	53	Rhode Island Red	Peritonitis and oviductitis.
,, 8	131	23	Rhode Island Red	Fatty liver.
,, 14	32	4	White Wyandotte	Cause of death not apparent.
,, 21	378	67	Rhode Island Red	Lymphomatosis of the peritoneum.
,, 25	601	96	White Leghorn	Peritonitis and oviductitis.
,, 27	318	56	Rhode Island Red	Leukaemia.
,, 28	101	15	White Wyandotte	Peritonitis and oviductitis.
,, 30	357	64	Rhode Island Red	Peritonitis and oviductitis.
May 2	449	82	Rhode Island Red	Tuberculosis.
,, 14	497	108	Light Sussex	Leukaemia.
,, 21	47	6	White Wyandotte	Tuberculosis.
,, 24	342	60	Rhode Island Red	Peritonitis and oviductitis.
,, 28	529	114	Light Sussex	Visceral gout.
,, 30	46	6	White Wyandotte	Tuberculosis.
,, 30	108	16	Rhode Island Red	Peritonitis and oviductitis.
June 3	44	6	White Wyandotte	Tuberculosis.
,, 8	428	78	Rhode Island Red	Tuberculosis.
,, 10	217	39	Rhode Island Red	Peritonitis and oviductitis.
,, 10	67	10	White Wyandotte	Peritonitis and oviductitis.
,, 13	83	12	White Wyandotte	Tuberculosis.
,, 14	17	1	White Wyandotte	Peritonitis and oviductitis.
,, 15	360	64	Rhode Island Red	Peritonitis and oviductitis.
,, 23	270	47	Rhode Island Red	Peritonitis and oviductitis.
,, 25	63	9	White Wyandotte	Peritonitis and oviductitis.
,, 30	169	30	Rhode Island Red	Peritonitis and oviductitis.
,, 30	99	15	White Wyandotte	Peritonitis and oviductitis.
July 5	531	114	Light Sussex	Tape-worm infestation.
,, 9	113	18	Rhode Island Red	Peritonitis and oviductitis.
,, 11	486	106	Light Sussex	Peritonitis.
,, 11	398	72	Rhode Island Red	Lymphomatosis of the ovaries.
,, 12	331	59	Rhode Island Red	Peritonitis.
,, 13	88	13	White Wyandotte	Lymphomatosis of the ovaries.
,, 15	194	34	Rhode Island Red	Neuro-lymphomatosis.
,, 25	445	82	Rhode Island Red	Tuberculosis.
,, 25	224	40	Rhode Island Red	Peritonitis.
,, 25	395	72	Rhode Island Red	Ascarid worm infestation and fatty liver.
Aug. 4	408	74	Rhode Island Red	Accidentally killed.
,, 4	407	74	Rhode Island Red	Accidentally killed.
,, 9	547	84	Rhode Island Red	Peritonitis and oviductitis.
,, 16	335	59	Rhode Island Red	Peritonitis and oviductitis.

TABLE X.

Number and Percentage of Deaths for each Breed.

BREED	Number of Birds Penned	Number of Deaths	Percentage of Deaths
			%
White Wyandotte	90	16	17.8
Rhode Island Red	342	36	10.5
White Leghorn	42	2	4.8
Light Sussex	90	7	7.8
Australorp	6	—	—
All Breeds	570	61	10.7

SECTION PRIZES.

SECTION I—WHITE WYANDOTTE.

OWNER OF PEN		Scoring Points	Special and First Grade Scoring Eggs
First Prize (£10) :	Sister-in-Charge, St. Martha's College, An Uaimh, Co. Meath.	2,638	1,113
Second Prize (£7) :	Sister-in-Charge, St. Mary's Domestic Science School, Dunmanway, Co. Cork.	2,324	1,042
Third Prize (£5) :	Mr. V. E. H. Bewley, Danum Firs, Zion Road, Rathgar, Dublin.	2,471	1,021
Fourth Prize (£4) :	Mrs. M. Nagle, Sandfield, Mallow, Co. Cork.	2,344	971
Fifth Prize (£2) :	Mr. V. E. H. Bewley, Danum Firs, Zion Road, Rathgar, Dublin.	2,211	938

Section II—White Wyandotte (Station Holders)

	Owner of Pen	Scoring Points	Special and First Grade Scoring Eggs
First Prize (£10) :	Mr. J. Lynch, Cooldoney, Abbeylara, Co. Longford.	3,306	1,364
Second Prize (£7) :	Miss M. Connolly, Carrigamore, Corvally P.O., Co. Monaghan.	3,111	1,270
Third Prize (£5) :	Mrs. K. Ryan, Farnane, Lisnagry, Co. Limerick.	2,969	1,215
Fourth Prize (£4) :	Mrs. W. Coleman, Banada, Ballaghaderreen, Co. Roscommon.	2,660	1,118
Fifth Prize (£2) :	Mrs. C. Monahan, Toor Cottage, Ballinabrackey, Co. Meath.	2,558	1,054

Section III—Rhode Island Red.

	Owner of Pen	Scoring Points	Special and First Grade Scoring Eggs
First Prize (£10) :	Mrs. K. Earl, Grantstown House, Waterford.	3,198	1,309
Second Prize (£7) :	Rev. Bro. J. J. Kelly, Industrial School, Artane, Co. Dublin.	3,044	1,272
Third Prize (£5) :	Mr. D. H. Edwards, Drumgowan, Burt, Co. Donegal.	3,019	1,229
Fourth Prize (£4) :	Mrs. A. P. Harris, Athassel, Golden, Co. Tipperary.	2,946	1,235
Fifth Prize (£2) :	Miss J. Horsburgh, Swift Brook House, Saggart, Co. Dublin.	2,930	1,188

SECTION IV—RHODE ISLAND RED (STATION HOLDERS).

	Owner of Pen	Scoring Points	Special and First Grade Scoring Eggs
First Prize (£10) :	Mrs. M. A. Kelly, Carronstown, Ballivor, Co. Meath.	2,883	1,210
Second Prize (£7) :	Miss C. Mealiff, Ballinamona House, Tullamore, Offaly.	2,841	1,181
Third Prize (£5) :	Mrs. A. E. Edwards, Hillsboro' House, Ramelton, Co. Donegal.	2,830	1,177
Fourth Prize (£4) :	Mrs. M. F. Smith, Bridge House, Bettystown, Co. Meath.	2,815	1,176
Fifth Prize (£2) :	Miss M. O'Donovan, Dromore, Villierstown, Cappoquin, Co. Waterford.	2,786	1,163

SECTION V—ANY NON-SITTING BREED.

	Owner of Pen	Breed	Scoring Points	Special and First Grade Scoring Eggs
First Prize (£10) :	Sister-in-Charge, St. Martha's College, An Uaimh, Co. Meath.	White Leghorn	2,809	1,152
Second Prize (£7) :	Mr. J. H. Malcolm, Cahirleske, Callan, Co. Kilkenny.	do.	2,758	1,164
Third Prize (£5) :	Mrs. M. O'Shea, Farrantane, Castlegregory, Co. Kerry.	do.	2,681	1,130
Fourth Prize (£4) :	Mrs. P. Collins, Pollinore, Corofin, Ballyglunin, Co. Galway.	do.	2,484	1,004
Fifth Prize (£2) :	Mrs. P. Walton, Ashtown Lodge, Castleknock, Co. Dublin.	do.	2,388	1,008

Section VI—Any Other Utility Breed.

Owner of Pen		Breed	Scoring Points	Special and First Grade Scoring Eggs
First Prize (£10) :	Mrs. M. Comerford, Lamogue, Windgap, Thomastown, Co. Kilkenny.	Light Sussex	2,789	1,151
Second Prize (£7) :	Mrs. M. Comerford, Lamogue, Windgap, Thomastown, Co. Kilkenny.	do.	2,698	1,130
Third Prize (£5) :	Mrs. M. Reeves, Knocksouna, Kilmallock, Co. Limerick.	do.	2,692	1,109
Fourth Prize (£4) :	Miss L. Hely-Hutchinson, Lissen Hall, Swords, Co. Dublin.	do.	2,682	1,107
Fifth Prize (£2) :	Miss K. Taylor, Deermount, Lissarda, Co. Cork.	do.	2,497	1,048

SPECIAL PRIZES.

The Special Prize of a Silver Cup (or its value, £10) for the Pen of birds scoring the highest number of points during the Test has been awarded to Mr. J. Lynch, Cooldoney, Abbeylara, Co. Longford, for Pen No. 14 (White Wyandotte) which scored 3,306 points.

Special prizes of £2 each have been awarded to the following owners :—

(1) Mr. D. H. Edwards, Drumgowan, Burt, Co. Donegal, for the sitting breed Pen No. 18 (Rhode Island Red) which scored 1,149 points during the period 1st October to 23rd December.

(2) Sister-in-Charge, St. Martha's College, An Uaimh, Co. Meath, for the non-sitting breed Pen No. 89 (White Leghorn) which scored 741 points during the period 1st October to 23rd December.

(3) Mr. J. Lynch, Cooldoney, Abbeylara, Co. Longford, for the *individual* sitting breed Bird No. 92 (Pen No. 14—White Wyandotte) which scored 657 points during the Test.

(4) Sister-in-Charge, St. Martha's College, An Uaimh, Co. Meath, for the *individual* non-sitting breed Bird No. 656 (Pen No. 89—White Leghorn) which scored 578 points during the Test.

(5) Miss M. Connolly, Carrigamore, Corvally P.O., Co. Monaghan, for the *individual* sitting breed Bird No. 84 (Pen No. 12—White Wyandotte) which scored 216 points during the period 1st October to 23rd December.

(6) Mrs. P. Walton, Ashtown Lodge, Castleknock, Co. Dublin, for the *individual* non-sitting breed Bird No. 645 (Pen No. 87—White Leghorn) which scored 186 points during the period 1st October to 23rd December.

SECTION I.—WHITE WYANDOTTE—8 Pens.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1948	No. of Bird	Weight On Arrival lb.	Weight On Arrival oz.	Weight At Close of Test lb.	Weight At Close of Test oz.	Eggs Laid Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug 4	Aug. 5–Aug. 18	Total	Grading Special Grade	First Grade	Under First Grade	Non-Scoring Special and First-Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points Oct. 1–Dec. 23	Full Period	Average Weight of Eggs oz.	dr.	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
1	5	Sister-in-Charge,	Feb. 1	37	4	12	6	0	2	—	15	20	16	22	24	22	21	21	21	11	195	87	106	2	—	15	45	454	2	3	—	(a) 1,157 Eggs
		St. Martha's College,	,,	38	5	4	6	0	—	—	14	16	18	18	22	16	19	4	15	1	143	122	21	—	2	14	42	316	2	5	2	
		An Uaimh,	,,	39	6	8	8	7	19	21	24	19	21	21	23	21	10	17	12	11	219	177	40	2	—	62	186	536	2	5	1	(b) 26.4 oz.
		Co. Meath.	Jan. 25	40	5	0	5	14	19	5	3	22	27	20	23	25	25	25	22	12	223	44	172	7	1	21	63	508	2	2	—	
			,,	41	4	8	5	13	22	18	18	—	11	19	20	23	21	7	14	4	177	49	119	9	—	52	156	413	2	2	1	(c) 2,638 Points
			Feb. 17	42	4	14	6	0	22	2	6	22	21	23	20	20	20	18	16	10	200	83	96	21	—	9	27	411	2	2	—	
2	8	Sister-in-Charge,	February	55	5	8	6	5	17	16	15	5	9	17	19	24	16	16	11	7	172	158	14	—	—	48	144	426	2	5	—	(a) 1,107 Eggs
		St. Mary's Domestic	,,	56	5	0	5	4	2	19	19	9	16	19	20	22	23	16	21	5	191	118	71	2	—	38	114	458	2	4	—	
		Science School,	,,	57	5	0	6	8	3	20	20	21	19	20	20	21	14	11	21	9	199	177	22	—	1	43	129	480	2	5	1	(b) 27.1 oz.
		Dunmanway,	,,	58	5	4	6	0	17	22	22	24	23	21	21	13	22	14	17	11	227	223	4	—	29	61	180	487	2	7	2	
		Co. Cork.	,,	59	4	14	5	8	16	19	19	14	14	16	18	16	11	21	19	7	190	62	99	29	—	36	108	405	2	2	—	(c) 2,524 Points
			,,	60	5	4	6	4	—	—	—	2	18	21	23	24	20	19	—	1	128	20	104	4	—	—	—	268	2	2	1	
3	3	Mr. V. E. H. Bewley,	—	25	5	8	5	9	24	22	20	21	18	20	22	25	11	12	20	11	226	94	122	10	—	56	168	531	2	3	1	(a) 1,103 Eggs
		Danum Firs,	—	26	4	12	5	4	8	21	20	18	15	18	18	11	11	11	19	6	176	120	54	2	3	47	141	422	2	4	2	
		Zion Road,	—	27	5	0	6	0	2	22	23	20	21	19	21	22	22	22	21	11	226	195	31	—	2	47	141	549	2	6	—	(b) 26.6 oz.
		Rathgar,	—	28	4	8	4	9	—	—	—	—	14	21	23	9	19	—	—	3	89	1	35	53	—	—	—	75	1	15	1	
		Dublin.	—	29	5	0	5	8	7	25	23	16	24	22	17	20	15	12	11	4	196	62	127	7	1	48	144	450	2	2	1	(c) 2,471 Points
			—	30	5	4	6	6	—	8	21	19	20	19	20	21	17	20	17	8	190	141	45	4	—	27	81	444	2	5	—	
4	7	Mrs. M. Nagle,	Mar. 22	49	5	7	5	8	23	19	20	21	22	21	21	24	22	21	19	10	243	25	160	58	3	16	48	428	2	0	—	(a) 1,121 Eggs
		Sandfield,	,,	50	5	15	7	2	20	22	18	19	16	18	24	19	16	12	3	—	187	176	10	1	2	60	180	443	2	7	1	
		Mallow,	,,	51	5	14	6	8	19	21	22	20	18	21	16	19	18	17	11	8	210	129	80	1	—	61	183	515	2	4	—	(b) 26.0 oz.
		Co. Cork.	,,	52	5	2	D		22	22	20	18	1	—	D	—	—	—	—	—	83	2	24	57	—	15	45	67	1	14	—	
			,,	53	5	4	5	12	20	17	14	8	3	20	20	19	20	18	13	7	179	73	97	9	1	51	153	418	2	2	—	(c) 2,344 Points
			,,	54	5	1	6	0	9	18	21	18	22	23	22	24	21	20	13	8	219	105	96	18	—	30	90	473	2	3	—	

D = Dead.

SECTION I.—WHITE WYANDOTTE—continued

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1948	No. of Bird	Weight: On Arrival (lb. oz.)	Weight: At Close of Test (lb. oz.)	Eggs Laid: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring Special and First-Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs (oz. dr.)	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
5	2	Mr. V. E. H. Bewley,	—	19	6 4	7 4	8	18	20	17	16	20	20	24	21	22	23	10	219	214	5	—	1	46	138	536	2 6	—	(a) 1,059 Eggs
		Danum Firs,	—	20	5 12	6 8	22	23	20	20	22	20	22	21	12	8	22	7	219	38	140	41	1	30	90	420	2 1	1	
		Zion Road,	—	21	6 0	6 15	—	—	—	—	7	24	25	25	24	23	14	8	150	90	57	3	1	—	—	336	2 4	—	(b) 27.0 oz.
		Rathgar,	—	22	5 12	6 12	15	—	3	16	17	16	11	12	9	14	19	9	141	125	15	1	48	18	36	224	2 6	—	
		Dublin.	—	23	5 14	6 13	—	—	—	17	20	14	19	22	16	20	16	7	151	126	25	—	13	—	—	315	2 6	—	(c) 2,211 Points
			—	24	5 0	6 0	6	—	11	21	20	22	25	14	20	17	11	12	179	39	129	11	1	12	36	380	2 2	1	
6	1	Hon. Mrs. W. French,	Mar. 27	13	4 14	6 12	16	24	25	19	21	18	18	22	19	12	13	5	212	32	163	17	4	49	147	461	2 2	—	(a) 1,251 Eggs
		Croghan House,	,,	14	5 3	7 8	18	25	20	22	21	23	27	23	15	16	15	13	238	100	123	15	7	50	150	524	2 3	2	
		Boyle,	,,	15	5 6	6 14	9	22	21	23	21	22	23	13	—	20	12	—	186	19	159	8	1	48	141	431	2 2	2	(b) 24.6 oz.
		Co. Roscommon.	,,	16	4 12	5 9	4	19	24	20	20	21	20	19	16	16	15	10	204	2	83	119	—	20	60	210	1 15	1	
			,,	17	5 3	D	27	12	18	26	20	20	17	11	6	D2	—	—	159	44	75	40	7	17	51	248	2 1	I	(c) 2,027 Points
			,,	18	4 8	5 15	27	26	25	24	25	24	24	19	18	13	16	11	252	5	58	189	—	1	3	158	1 14	1	
7	6	Miss B. Quain,	March	43	5 0	6 0	5	25	23	14	20	16	22	17	21	21	16	2	202	62	124	16	—	43	129	454	2 2	—	(a) 865 Eggs
		Anglesboro',	,,	44	4 9	D	—	—	—	—	12	10	15	18	D	—	—	—	55	38	17	—	—	—	—	110	2 4	—	
		via Mitchelstown,	,,	45	5 5	7 0	—	4	21	20	16	18	23	24	23	22	25	10	206	194	12	—	1	25	75	491	2 7	—	(b) 27.1 oz.
		Co. Limerick.	,,	46	4 8	D	—	—	16	11	13	15	22	19	D	—	—	—	96	61	33	2	—	14	42	202	2 4	—	
			,,	47	4 10	D	—	—	19	4	13	18	21	7	D	—	—	—	82	14	53	15	—	19	57	153	2 1	—	(c) 1,945 Points
			,,	48	4 14	6 4	20	22	19	14	20	20	20	19	24	20	19	7	224	173	49	2	6	60	180	535	2 4	—	
8	4	Mrs. N. F. Forde,	Feb. 9	31	5 7	6 14	23	23	18	20	15	18	24	18	15	13	14	7	208	116	89	3	—	61	183	505	2 4	—	(a) 848 Eggs
		Corbally,	,,	32	5 1	D	13	12	20	17	17	14	d11	—	—	—	—	—	104	—	63	41	—	27	81	153	1 15	—	
		Limerick.	,,	33	5 12	D	24	—	18	19	—	D	—	—	—	—	—	—	61	6	51	4	—	38	114	152	2 1	—	(b) 25.3 oz.
			,,	34	5 1	5 15	2	15	6	—	—	22	21	16	13	17	13	6	131	1	78	52	7	20	60	187	2 0	—	
			,,	35	5 12	7 2	22	23	5	—	19	23	23	23	19	16	15	6	194	44	126	24	2	27	81	399	2 2	—	(c) 1,744 Points
			,,	36	5 14	4 0	21	23	10	8	20	16	20	13	9	10	—	—	150	64	82	4	2	51	153	348	2 2	1	

D = Dead.

SECTION II.—WHITE WYANDOTTE (STATION HOLDERS)—7 Pens.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1948	No. of Bird	Weight: On Arrival (lb. oz.)	Weight: At Close of Test (lb. oz.)	Eggs Laid: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs (oz. dr.)	Number of times Broody	(a) Total Eggs from Pen (b) Average Weight per dozen. (c) Scoring Points per Pen.
1	14	Mr. J. Lynch,	Feb. 19	91	5 0	8 0	22	21	20	19	16	17	21	24	24	19	7	12	222	171	40	11	1	52	153	509	2 5	1	(a) 1,444 Eggs
		Cooldoney,	,,	92	5 9	6 0	20	26	25	22	22	24	27	28	21	23	22	13	273	153	114	6	—	65	195	657	2 3	—	
		Abbeylara,	,,	93	5 14	6 4	13	24	24	22	24	24	25	20	24	26	23	11	260	39	188	33	—	37	111	548	2 1	—	(b) 26.6 oz.
		Co. Longford.	,,	94	5 10	6 12	7	21	16	15	21	22	27	21	23	22	18	14	227	85	120	22	—	24	72	488	2 3	—	
			,,	95	4 8	5 0	6	18	18	20	19	20	22	21	21	20	23	11	219	125	88	6	—	36	108	516	2 3	—	(c) 3,306 Points
			,,	96	4 15	6 8	15	18	23	20	21	24	26	24	23	24	22	3	243	214	28	1	—	55	165	588	2 6	—	
2	12	Miss M. Connolly,	February	79	5 0	6 14	13	21	19	20	22	23	21	20	20	22	18	10	229	164	64	1	1	52	156	555	2 4	—	(a) 1,280 Eggs
		Carrigamore,	,,	80	5 0	6 12	20	22	18	19	21	20	22	21	20	22	22	9	236	231	4	1	—	59	177	582	2 6	—	
		Corvally P.O.,	,,	81	5 2	6 4	22	23	23	23	21	24	23	20	13	21	21	5	239	165	72	2	2	66	195	581	2 3	1	(b) 27.6 oz.
		Co. Monaghan.	,,	82	5 0	6 8	—	2	18	18	18	20	23	24	19	17	19	9	187	164	23	—	—	20	60	439	2 5	—	
			,,	83	5 12	D	13	17	22	14	15	19	9	17	—	D	—	—	141	90	50	1	—	57	171	337	2 3	—	(c) 3,111 Points
			,,	84	4 15	5 15	27	24	22	22	18	20	21	17	24	18	25	10	248	203	44	1	1	72	216	617	2 6	—	
3	11	Mrs. K. Ryan,	Feb. 12	73	4 8	6 0	8	20	22	13	12	16	23	24	18	16	18	10	200	191	9	—	—	50	150	494	2 6	—	(a) 1,240 Eggs
		Farnane,	,,	74	4 12	7 7	—	—	13	14	16	13	18	19	19	18	14	6	150	144	6	—	3	13	39	343	2 6	—	
		Lisnagry,	,,	75	5 4	6 3	22	26	26	24	25	23	23	26	22	26	20	13	276	25	234	17	—	67	201	642	2 1	—	(b) 27.9 oz.
		Co. Limerick.	,,	76	4 14	6 0	3	21	21	6	—	18	21	26	23	19	18	10	186	179	7	—	3	45	135	455	2 8	—	
			,,	77	4 14	7 0	23	18	22	23	19	22	21	22	19	17	15	8	229	166	62	1	—	62	186	558	2 5	—	(c) 2,969 Points
			,,	78	5 9	5 15	23	24	24	23	19	21	22	17	15	10	—	1	199	199	—	—	1	71	213	477	2 8	—	
4	15	Mrs. W. Coleman,	Jan. 6	97	5 0	5 8	18	24	22	20	21	22	22	19	14	13	19	—	214	75	131	8	1	56	168	498	2 2	1	(a) 1,182 Eggs
		Banada,	,, 29	98	5 2	6 6	25	24	23	22	23	23	24	24	26	20	22	7	263	108	144	11	—	66	198	616	2 3	—	
		Ballaghaderreen,	,, 6	99	5 7	D	19	—	4	19	23	22	22	5	—	D	—	—	114	79	34	1	—	22	66	248	2 4	—	(b) 25.8 oz.
		Co. Roscommon.	,, 21	100	6 0	6 5	2	26	23	23	19	20	23	23	15	13	18	6	211	14	161	36	1	41	120	409	2 1	2	
			,, 6	101	5 14	D	—	21	20	20	23	23	24	d11	—	—	—	—	142	53	89	—	—	41	123	325	2 3	—	(c) 2,660 Points
			,, 6	102	4 13	6 12	8	26	25	23	22	23	24	19	22	18	19	9	238	115	118	5	1	55	162	564	2 3	—	

D = Dead.

SECTION II.—WHITE WYANDOTTE (STATION HOLDERS)—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1948	No. of Bird	Weight: On Arrival lb. oz.	Weight: At Close of Test lb. oz.	Eggs Laid: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs oz. dr.	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
5	10	Mrs. C. Monahan,	January	67	5 13	D	18	21	22	16	18	20	22	19	9	D	—	—	165	122	38	5	—	57	171	377	2 4	—	(a) 1,066 Eggs
		Toor Cottage,	,,	68	5 4	7 4	—	19	20	22	21	19	24	23	9	16	22	10	205	203	2	—	1	39	117	495	2 10	1	
		Ballinabrackey,	February	69	5 8	7 15	17	22	21	16	14	17	7	—	—	—	—	—	114	87	27	—	—	60	180	288	2 4	—	(b) 28.0 oz.
		Hill-of-Down,	,,	70	4 9	5 14	21	24	11	19	23	24	25	25	18	16	22	2	230	133	93	4	—	52	156	544	2 3	3	
		Co. Meath.	,,	71	4 12	6 5	—	17	9	—	10	19	25	25	15	14	19	9	162	100	62	—	—	26	78	392	2 4	3	(c) 2,558 Points
			,,	72	5 0	7 15	20	18	21	18	18	20	21	15	11	15	13	—	190	178	12	—	2	59	177	462	2 7	—	
6	9	Sister Longinus,	Mar. 8	61	4 9	5 8	18	18	17	17	16	17	21	18	14	16	15	7	194	178	16	—	—	53	159	479	2 6	—	(a) 870 Eggs
		Marist Convent,	,,	62	4 14	6 8	14	20	13	10	16	16	20	3	—	—	—	—	112	73	39	—	2	47	141	267	2 4	—	
		Tubbercurry,	,,	63	5 4	D	12	—	21	19	19	21	18	5	—	D	—	—	115	3	92	20	—	18	54	208	2 1	—	(b) 25.6 oz.
		Co. Sligo.	,,	64	4 8	6 4	18	23	22	24	20	17	19	19	—	12	10	—	184	1	55	128	3	1	3	116	1 14	—	
			,,	65	4 10	4 8	21	21	16	21	20	18	24	23	9	15	9	2	199	51	143	5	—	56	168	468	2 2	2	(c) 1,673 Points
			,,	66	4 12	6 8	9	16	17	1	6	10	—	—	7	—	—	—	66	8	48	10	3	32	87	135	2 1	—	
7	13	Mr. W. Barron, P.C.,	Feb. 23	85	5 7	D	25	24	7	D	—	—	—	—	—	—	—	—	56	3	22	31	—	25	75	75	1 15	—	(a) 609 Eggs
		Woodview P. F.,	,,	86	4 14	D	2	21	11	D	—	—	—	—	—	—	—	—	34	22	12	—	—	34	102	102	2 3	—	
		Gortrush,	,,	87	4 12	D	22	22	18	16	3	D	—	—	—	—	—	—	81	4	52	25	—	51	153	163	1 15	—	(b) 24.9 oz.
		Piltown,	,,	88	5 1	D	—	4	13	10	15	11	21	18	6	—	D	—	98	38	54	6	—	17	51	201	2 3	—	
		Co. Kilkenny.	,,	89	4 12	5 12	—	—	19	13	—	—	8	18	20	21	22	5	126	2	89	35	—	17	51	219	2 0	—	(c) 1,254 Points
			,,	90	4 15	7 0	—	—	21	19	21	21	26	26	25	26	16	13	214	35	175	4	—	21	63	494	2 2	1	

D=Dead.

SECTION III.—RHODE ISLAND RED—30 Pens.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1948	No. of Bird	Weight On Arrival lb.	Weight On Arrival oz	Weight At Close of Test lb.	Weight At Close of Test oz	Eggs Laid Oct. 1–Oct. 28	Eggs Laid Oct. 29–Nov. 25	Eggs Laid Nov. 26–Dec. 23	Eggs Laid Dec. 24–Jan. 20	Eggs Laid Jan. 21–Feb. 17	Eggs Laid Feb. 18–Mar. 17	Eggs Laid Mar. 18–Apl. 14	Eggs Laid Apl. 15–May 12	Eggs Laid May 13–June 9	Eggs Laid June 10–July 7	Eggs Laid July 8–Aug. 4	Eggs Laid Aug. 5–Aug. 18	Total	Grading: Special Grade	Grading: First Grade	Grading: Under First Grade	Grading: Non-Scoring Special and First Grade	Grading: Special and First Grade—Oct. 1–Dec. 23	Scoring Points Oct. 1–Dec. 23	Scoring Points Full Period	Average Weight of Eggs oz.	Average Weight of Eggs dr.	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
1	44	Mrs. K. Earl,	Feb. 12	247	5	14	7	3	18	—	18	23	23	22	23	24	22	14	22	14	223	143	75	5	13	36	105	486	2	4	1	(a) 1,337 Eggs
		Grantstown House,	,,	248	5	12	7	0	18	18	19	18	21	20	22	23	22	21	15	12	229	140	88	1	1	55	165	556	2	4	—	(b) 27.8 oz.
		Waterford.	,,	249	5	9	6	8	20	20	21	19	19	20	19	24	12	21	9	10	214	211	3	—	—	61	183	529	2	7	2	(c) 3,198 Points
			—	250	5	14	7	1	23	19	22	19	20	21	23	21	15	22	18	4	227	223	4	—	—	64	192	562	2	6	—	
			Mar. 18	251	5	4	6	4	16	21	23	20	21	22	21	25	19	17	10	10	225	180	44	1	1	59	177	541	2	5	1	
			,, 6	252	5	4	6	0	18	25	19	16	20	19	22	22	17	18	18	5	219	148	66	5	1	57	171	524	2	4	—	
2	32	Rev. Bro. J. J. Kelly,	March	181	6	0	7	12	—	22	26	24	23	25	20	23	25	22	22	11	243	54	186	3	1	47	141	577	2	2	—	(a) 1,316 Eggs
		Industrial School,	,,	182	6	0	6	12	—	—	—	16	23	24	24	27	14	22	20	9	179	40	134	5	1	—	—	394	2	2	1	(b) 26.8 oz.
		Artane,	,,	183	5	8	6	4	4	22	23	21	22	24	25	23	24	20	24	8	240	193	47	—	1	49	147	578	2	5	—	(c) 3,044 Points
		Co. Dublin.	,,	184	5	12	6	4	24	20	22	20	19	19	24	20	6	17	18	5	214	63	123	28	—	38	114	450	2	2	2	
			April	185	5	5	7	0	—	—	25	23	22	24	26	28	19	19	26	11	223	219	3	1	—	24	72	524	2	7	—	
			,,	186	5	10	7	14	12	20	23	22	18	20	25	21	12	16	20	8	217	140	73	4	—	51	153	521	2	4	1	
3	18	Mr. D. H. Edwards,	Feb. 20	109	6	6	7	15	20	21	23	20	22	20	18	22	13	13	15	8	215	190	25	—	2	64	192	525	2	5	—	(a) 1,285 Eggs
		Drumgowan,	Jan. 29	110	7	5	8	0	23	21	20	21	21	22	23	21	20	19	22	10	243	225	17	1	2	63	189	594	2	5	—	(b) 27.0 oz.
		Burt,	Mar. 3	111	6	5	8	7	21	24	25	21	20	22	2.	9	—	—	—	—	166	140	26	—	—	70	210	402	2	4	—	(c) 3,019 Points
		Speenogue P.O.,	Jan. 17	112	6	8	8	8	25	24	22	20	25	25	22	25	16	22	21	9	254	181	72	1	4	70	210	616	2	4	—	
		Co. Donegal.	,, ,,	113	6	14	D		21	23	23	21	22	23	21	25	21	25	D1	—	226	—	183	43	1	55	165	442	2	0	—	
			Feb. 20	114	6	4	7	8	19	22	21	18	20	19	19	9	12	8	8	6	181	174	6	1	1	61	183	440	2	6	—	
4	26	Mrs. A. P. Harris,	Jan. 7	145	5	8	7	14	20	3	—	11	20	23	24	26	21	24	26	14	212	188	23	1	1	23	69	506	2	5	—	(a) 1,272 Eggs
		Athassel,	,, ,,	146	6	9	8	2	16	19	20	18	15	18	23	26	23	24	17	11	230	151	74	5	1	50	150	549	2	4	—	(b) 27.4 oz.
		Golden,	,, 29	147	6	1	7	14	17	23	24	19	20	25	21	21	21	22	12	1	226	223	3	—	1	64	192	548	2	6	—	(c) 2,946 Points
		Cashel,	,, ,,	148	6	2	8	8	16	2	7	20	19	25	25	25	22	21	24	9	215	188	24	3	—	24	72	500	2	5	—	
		Co. Tipperary.	,, 7	149	5	14	7	14	—	—	5	22	20	20	25	24	24	18	18	10	186	178	8	—	—	5	15	423	2	6	—	
			,, 29	150	5	0	6	12	3	—	18	21	21	22	20	23	23	21	21	10	203	42	137	24	1	21	63	420	2	2	—	
5	41	Miss I. J. Horsburgh,	February	229	5	8	6	13	9	21	14	—	11	23	23	20	16	22	22	11	192	137	55	—	—	44	132	483	2	4	—	(a) 1,191 Eggs
		Swift Brook House,	,,	230	6	0	7	8	16	15	16	7	16	2	21	23	22	19	19	10	185	161	24	—	—	47	141	464	2	5	—	(b) 28.0 oz.
		Saggart,	,,	231	6	0	7	2	1	19	14	—	12	21	23	24	24	23	24	10	195	174	20	1	—	33	99	478	2	5	—	(c) 2,930 Points
		Co. Dublin.	,,	232	5	9	6	0	22	20	22	16	17	16	22	22	19	22	19	7	224	156	66	2	—	62	186	554	2	4	—	
			,,	233	5	4	6	3	14	20	15	20	23	14	16	19	20	18	19	9	207	197	10	—	—	49	147	509	2	6	—	
			,,	234	5	8	6	8	—	2	19	19	22	18	22	22	19	17	18	10	188	188	—	—	—	21	63	442	2	9	—	

D = Dead.

SECTION III.—RHODE ISLAND RED—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1948	No. of Bird	Weight: On Arrival lb. oz.	Weight: At Close of Test lb. oz.	Eggs Laid: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs oz. dr.	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
6	33	Miss M. O'Donovan,	Jan. 22	187	5 8	7 8	12	18	19	6	3	22	23	24	17	5	18	4	171	117	51	3	—	49	147	412	2 4	2	(a) 1,169 Eggs
		Dromore,	Feb. 20	188	5 8	6 4	—	12	19	15	20	20	23	21	17	18	18	7	190	104	86	—	—	31	93	454	2 4	—	
		Villierstown,	Mar. 18	189	5 8	5 8	—	—	13	21	22	21	21	24	19	18	—	—	159	156	3	—	—	13	39	349	2 7	—	(b) 26.6 oz.
		Cappoquin,	,,	190	5 4	6 4	18	24	21	22	21	20	19	21	9	10	7	4	196	150	45	1	2	62	186	468	2 4	1	
		Co. Waterford.	,,	191	5 8	6 4	13	18	21	18	19	22	18	23	17	20	22	10	221	114	105	2	1	50	150	537	2 3	—	(c) 2,761 Points
			,,	192	5 5	6 8	—	4	26	23	24	23	27	25	24	23	21	12	232	24	204	4	—	29	87	541	2 1	—	
7	40	Sister-in-Charge,	Feb. 1	223	5 0	5 12	8	—	12	20	22	23	25	26	24	24	20	12	216	8	171	37	1	13	39	409	2 1	—	(a) 1,136 Eggs
		St. Martha's College,	Jan. 22	224	5 0	D	18	17	21	20	22	20	18	22	18	15	D7	—	198	56	131	11	3	55	165	440	2 2	—	
		An Uaimh,	,, 25	225	5 0	6 4	—	—	—	—	10	21	17	—	7	18	16	8	97	85	12	—	8	—	—	215	2 7	—	(b) 26.4 oz.
		Co. Meath.	,, ,,	226	5 0	6 8	17	16	19	19	20	21	24	25	24	21	24	11	241	185	56	—	—	52	156	590	2 4	—	
			,, 22	227	5 0	5 0	14	—	—	—	18	20	21	21	—	20	5	—	119	28	86	5	—	11	33	264	2 2	—	(c) 2,567 Points
			,, ,,	228	5 0	6 7	23	24	25	25	23	25	23	25	20	21	23	8	265	171	94	—	2	72	216	649	2 4	—	
8	25	Mrs. M. McNamara,	Mar. 20	139	6 9	7 0	5	21	21	2	5	23	24	20	22	23	24	11	201	184	17	—	—	47	141	507	2 5	—	(a) 1,187 Eggs
		Brook Lodge,	,,	140	6 0	8 1	—	—	—	15	25	25	23	27	23	22	21	18	194	25	149	20	2	—	—	396	2 1	—	
		Kilmeedy,	,,	141	6 4	5 11	—	—	11	2	6	23	25	25	23	17	17	—	149	4	121	24	1	9	27	286	2 1	—	(b) 25.5 oz.
		Co. Limerick.	,,	142	5 15	7 8	—	21	25	25	25	25	23	22	24	23	20	8	241	64	168	9	4	44	129	536	2 3	—	
			,,	143	6 8	7 3	—	—	20	17	23	22	18	19	—	12	9	7	147	48	94	5	4	18	51	326	2 0	3	(c) 2,552 Points
			,,	144	5 5	7 0	23	26	24	22	23	26	27	26	24	21	8	5	255	37	179	39	3	41	123	501	2 1	—	
9	16	Mrs. P. Roche,	Feb. 10	103	5 13	6 10	4	8	21	12	15	22	21	24	24	17	15	10	193	177	15	1	2	32	96	453	2 5	—	(a) 1,076 Eggs
		Rockview,	,, 17	104	5 8	6 12	—	—	9	18	21	25	21	18	22	17	19	6	176	152	24	—	5	9	27	388	2 5	—	
		Tullow,	,, ,,	105	4 15	7 0	—	4	20	20	18	18	21	20	18	21	17	9	186	97	89	—	—	24	72	443	2 3	—	(b) 27.3 oz.
		Co. Carlow.	Mar. 6	106	5 4	7 8	10	14	—	9	22	19	19	24	20	21	20	9	187	155	32	—	—	24	72	448	2 5	—	
			Feb. 17	107	5 4	7 7	—	12	16	—	12	22	25	24	19	20	16	10	176	140	35	1	—	28	84	424	2 4	—	(c) 2,511 Points
			,, 23	108	5 7	D	—	20	22	23	18	21	23	19	12	D	—	—	158	105	52	1	—	41	123	355	2 4	—	
10	46	Mrs. C. Healy,	Feb. 7	259	5 11	7 0	21	21	16	21	19	19	24	24	22	17	12	9	225	22	163	40	—	28	84	433	2 1	1	(a) 1,094 Eggs
		Clonmeen,	February	260	6 12	7 9	8	5	19	14	17	19	20	25	16	—	—	—	143	141	2	—	—	32	96	318	2 8	—	
		Banteer,	,,	261	5 12	6 0	17	8	—	—	—	7	17	23	20	21	28	12	153	84	68	1	1	25	75	388	2 3	—	(b) 27.1 oz.
		Co. Cork.	,,	262	6 8	7 15	6	22	22	19	19	21	19	24	10	15	19	12	208	184	23	1	3	49	147	501	2 6	2	
			,,	263	6 1	7 6	20	16	—	—	—	16	22	20	21	16	12	13	156	58	91	7	1	32	96	368	2 2	1	(c) 2,491 Points
			,,	264	6 0	6 8	—	—	22	23	23	22	24	24	22	22	18	9	209	194	15	—	2	22	66	483	2 6	—	

SECTION III.—RHODE ISLAND RED—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1948	No. of Bird	Weight On Arrival lb.	oz.	Weight At Close of Test lb.	oz.	Eggs Laid Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading Special Grade	First Grade	Under First Grade	Non-Scoring Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points Oct. 1–Dec. 23	Full Period	Average Weight of Eggs oz.	dr.	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
11	31	Rev. Bro. J. Edwards,	Mar. 28	175	5	0	6	11	16	23	25	8	—	14	26	28	25	27	21	13	226	194	31	1	1	63	189	571	2	5	—	(a) 1,128 Eggs
		Agricultural College,	,,	176	5	4	7	8	—	—	—	16	13	21	25	24	23	20	24	10	176	104	70	2	—	—	—	402	2	4	—	
		Mount Bellew,	,,	177	4	8	7	8	3	17	16	11	19	22	23	20	17	11	13	6	178	13	58	107	4	17	51	167	2	0	—	(b) 26.7 oz.
		Co. Galway.	,,	178	4	12	7	8	—	15	20	7	13	23	26	22	21	23	23	11	204	177	26	1	1	35	105	495	2	5	—	
			,,	179	5	0	6	0	15	22	2	5	9	—	7	9	16	20	22	9	136	100	36	—	—	39	117	362	2	4	—	(c) 2,489 Points
			,,	180	4	8	7	0	—	9	20	15	11	17	24	26	24	26	25	11	208	84	119	5	—	25	75	492	2	3	—	
12	27	Mrs. A. P. Harris,	Jan. 29	151	5	7	8	8	—	19	18	12	13	17	17	20	21	18	19	7	181	181	—	—	—	37	111	443	2	9	—	(a) 1,014 Eggs
		Athassel,	,, 7	152	5	7	7	10	—	5	13	17	13	15	17	15	7	—	9	8	119	94	25	—	1	18	51	270	2	5	1	
		Golden,	Mar. 16	153	5	4	8	6	—	—	—	3	22	23	25	24	26	23	22	11	179	178	1	—	—	—	—	414	2	6	—	(b) 27.8 oz.
		Cashel,	Jan. 7	154	5	8	8	6	12	25	6	15	27	24	25	15	22	16	5	13	205	154	48	3	—	43	129	481	2	4	1	
		Co. Tipperary.	,, 29	155	5	4	6	14	—	—	4	15	18	18	15	20	21	23	23	10	167	28	131	8	1	4	12	368	2	2	—	(c) 2,379 Points
			,, ,,	156	5	1	7	8	12	13	21	3	14	22	23	19	—	8	19	9	163	96	65	2	—	45	135	403	2	3	1	
13	53	Mr. M. McCarthy,	Mar. 1	295	4	8	6	4	—	—	8	18	22	22	25	27	26	26	23	13	210	3	172	35	—	6	18	405	2	1	—	(a) 1,175 Eggs
		Caherelly Castle,	,,	296	4	8	D		—	—	—	15	19	21	d20	—	—	—	—	—	75	54	21	—	—	—	—	150	2	5	—	
		Grange,	,,	297	4	8	6	8	—	17	27	23	24	27	24	25	7	23	21	11	229	93	134	2	—	42	126	551	2	3	1	(b) 25.2 oz.
		Kilmallock,	,,	298	4	9	7	0	—	—	19	25	25	23	24	27	24	16	21	14	218	55	157	6	—	19	57	493	2	2	1	
		Co. Limerick.	,,	299	4	8	6	4	—	4	25	24	21	25	26	25	—	16	24	11	201	20	171	10	—	28	84	459	2	2	—	(c) 2,334 Points
			,,	300	4	9	5	0	18	25	25	23	22	24	26	25	24	16	3	11	242	2	110	130	—	39	117	276	1	15	1	
14	28	Mrs. J. Hyde,	—	157	6	14	6	4	—	3	23	18	13	15	17	12	10	9	8	—	128	111	17	—	—	26	78	299	2	5	1	(a) 985 Eggs
		Killeens Farm,	Mar. 1	158	5	3	5	8	—	6	23	22	22	25	28	25	13	25	18	11	218	60	155	3	1	27	81	508	2	3	1	
		Cork.	Feb. 4	159	6	8	7	8	11	21	15	5	19	14	—	—	—	—	—	—	85	83	2	—	—	47	141	217	2	7	—	(b) 27.0 oz.
			,, 20	160	6	0	6	12	—	6	16	16	12	18	27	25	23	22	15	8	188	66	115	7	—	20	60	427	2	3	—	
			,, ,,	161	6	4	7	12	—	13	20	16	2	3	22	23	24	20	23	9	175	74	97	4	—	33	99	426	2	3	—	(c) 2,330 Points
			,, 14	162	6	12	7	0	—	11	19	7	14	21	25	25	19	20	20	10	191	164	24	3	—	27	81	453	2	5	—	
15	48	Mr. H. A. Earl,	—	241	5	12	6	4	6	—	19	21	23	24	25	18	23	1	20	4	184	111	72	1	1	24	72	412	2	4	2	(a) 1,030 Eggs
		Grantstown House,	—	242	5	0	5	8	—	12	4	17	24	20	20	23	16	19	14	—	169	63	96	10	4	15	45	358	2	8	1	
		Waterford.	—	243	5	8	6	3	22	24	24	20	16	20	23	22	22	22	14	5	234	110	121	3	—	67	201	570	2	3	—	(b) 25.8 oz.
			Mar. 18	244	5	8	7	10	—	—	8	12	9	8	9	8	5	19	14	4	96	25	62	9	—	5	15	216	2	2	—	
			,,	245	6	2	7	12	24	21	15	—	—	13	24	22	14	14	18	—	165	20	110	35	—	34	102	326	2	1	2	(c) 2,276 Points
			Feb. 23	246	6	0	7	0	22	—	—	1	18	24	25	25	24	13	25	5	182	27	141	14	—	20	60	394	2	2	1	

D=Dead.

SECTION III.—RHODE ISLAND RED—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1948	No. of Bird	Weight: On Arrival lb. oz.	Weight: At Close of Test lb. oz.	Eggs Laid: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs oz. dr.	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
16	48	Miss C. Mealiff,	Mar. 23	271	6 0	7 4	—	16	18	20	20	19	18	19	20	21	17	7	195	141	51	3	—	31	93	460	2 4	—	(a) 957 Eggs
		Ballinamona House,	,,	272	5 12	7 0	15	2	19	6	2	23	21	24	19	19	13	7	170	158	10	2	—	34	102	409	2 6	—	
		Tullamore,	,,	273	5 12	7 8	6	9	15	14	12	7	11	5	—	—	—	—	79	76	3	—	—	30	90	188	2 6	—	(b) 27.5 oz.
		Offaly.	,,	274	5 8	7 10	4	20	19	4	21	21	20	23	13	18	10	6	174	157	15	2	3	43	129	408	2 3	—	
			,,	275	5 4	7 0	17	19	11	20	18	19	19	16	12	7	7	1	166	73	88	5	—	42	126	379	2 3	—	(c) 3,260 Points
			,,	276	5 0	5 14	19	18	20	6	3	21	19	22	17	14	4	10	173	140	28	5	—	52	156	416	2 5	—	
17	49	Mrs. O. Hodgins,	Jan. 17	277	6 4	6 12	—	20	22	19	26	21	23	19	20	16	4	—	190	139	50	1	—	42	126	440	2 4	—	(a) 991 Eggs
		Roselawn,	,, 30	278	6 4	5 0	—	1	19	4	18	25	24	27	7	17	—	—	142	109	32	1	—	20	60	318	2 5	2	
		Cloughjordan,	,, 17	279	5 8	6 0	—	—	11	21	23	27	24	22	27	25	19	—	199	31	153	15	6	10	30	405	2 2	—	(b) 26.5 oz.
		Co. Tipperary.	,, 30	280	6 2	7 8	7	18	21	19	20	18	21	8	9	9	—	1	151	142	9	—	—	46	138	358	2 6	—	
			,, 17	281	5 5	6 10	8	23	24	21	23	26	26	25	17	23	19	8	243	30	184	29	—	52	156	528	2 1	—	(c) 2,234 Points
			Feb. 19	282	6 8	D	16	17	20	12	1	—	D	—	—	—	—	—	66	26	40	—	—	53	159	185	2 2	—	
18	42	Mr. H. A. Earl,	Feb. 12	235	6 15	D	D	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	(a) 1,044 Eggs
		Grantstown House,	,, ,,	236	5 12	7 10	—	3	22	18	22	22	23	22	25	24	22	10	213	56	157	—	2	25	75	501	2 3	—	
		Waterford.	,, 23	237	6 4	7 12	22	22	19	18	22	16	24	17	17	10	—	—	187	121	65	1	2	62	186	440	2 4	—	(b) 26.0 oz.
			Mar. 6	238	5 7	7 0	20	22	21	19	20	17	21	21	16	13	18	5	213	7	110	96	—	29	87	275	1 15	2	
			,, 18	239	7 0	6 12	22	23	21	23	20	22	22	6	19	14	13	6	211	155	53	3	—	63	189	512	2 4	2	(c) 2,222 Points
			,, ,,	240	6 2	8 0	23	22	21	22	26	23	27	25	18	8	5	—	220	126	86	8	1	59	177	494	2 3	1	
19	19	Mrs. M. J. Doyle,	January	115	5 0	7 15	—	—	9	17	18	11	16	—	—	2	3	—	76	3	72	1	—	9	27	164	2 2	—	(a) 910 Eggs
		Carrigeen,	,,	116	4 12	7 4	22	24	24	18	16	22	22	23	12	16	7	11	217	54	148	15	—	68	204	502	2 2	1	
		Baltinglass,	,,	117	5 0	7 15	21	21	20	23	20	11	9	15	17	17	17	10	201	72	126	3	—	61	183	500	2 2	—	(b) 25.8 oz.
		Co. Wicklow.	Jan. 18	118	4 14	5 14	—	20	24	19	21	23	20	25	20	16	7	8	203	84	118	1	—	44	132	479	2 3	—	
			,, ,,	119	4 14	6 5	2	21	14	—	13	19	24	24	18	22	21	5	183	101	81	1	—	37	111	449	2 3	—	(c) 2,162 Points
			,, ,,	120	5 0	D	5	—	21	4	D	—	—	—	—	—	—	—	30	—	24	6	—	20	60	68	2 1	—	
20	47	Miss A. M. Dempster,	March	265	4 9	5 9	8	19	20	15	15	19	20	25	21	14	6	8	190	147	43	—	—	47	141	455	2 4	1	(a) 921 Eggs
		Emo Park,	,,	266	4 8	6 10	8	22	12	16	16	16	18	19	16	17	15	5	180	168	11	1	1	41	123	433	2 5	—	
		Portarlington,	,,	267	4 8	6 8	—	—	—	11	25	21	15	26	23	19	17	10	167	71	94	2	1	—	—	373	2 3	—	(b) 26.9 oz.
		Laoighis.	,,	268	4 9	7 0	—	2	25	23	21	22	24	23	22	22	22	9	215	45	167	3	2	25	75	497	2 2	—	
			,,	269	4 10	7 12	—	—	—	8	8	7	19	13	7	14	10	1	87	58	29	—	38	—	—	114	2 5	—	(c) 2,069 Points
			,,	270	4 12	D	—	11	19	13	14	9	11	—	—	D5	—	—	82	51	30	1	—	30	90	197	2 4	—	

D = Dead.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1948	No. of Bird	Weight: On Arrival (lb. oz.)	Weight: At Close of Test (lb. oz.)	Eggs Laid: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs (oz. dr.)	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
21	37	Rev. Bro. P. Regan, O.M.I.,	Mar. 20	205	5 12	7 0	—	—	—	—	9	26	17	24	13	20	—	8	117	113	4	—	—	—	—	262	2 7	2	(a) 897 Eggs
		Our Lady of Lourdes,	,,	206	5 4	7 4	8	13	4	6	1	—	—	—	—	—	—	—	32	11	14	7	—	18	54	68	2 1	—	
		Cahermoyle,	,,	207	5 8	7 0	—	12	24	22	21	22	23	24	14	20	14	8	204	17	183	4	1	35	105	474	2 2	—	(b) 26.3 oz.
		Ardagh,	,,	208	6 0	6 4	20	17	19	8	19	17	24	26	22	22	15	11	220	31	162	27	3	46	138	467	2 1	—	
		Co. Limerick.	,,	209	6 4	8 6	17	20	19	21	17	10	—	—	—	—	—	—	104	9	71	24	—	32	96	192	2 1	—	(c) 1,987 Points
			,,	210	5 11	7 1	—	5	21	23	24	20	23	25	21	25	22	11	220	206	14	—	—	26	78	524	2 6	—	
22	35	Mrs. D. Philpott,	March	199	6 0	7 8	18	18	14	14	18	1	22	23	22	19	21	10	200	128	69	3	1	47	138	488	2 3	—	(a) 941 Eggs
		Charlesfield,	,,	200	5 7	4 4	20	13	—	—	9	9	4	22	21	15	6	—	119	3	74	42	15	—	—	131	1 15	—	
		Lyre,	,,	201	6 8	6 4	8	—	—	—	—	11	24	27	27	25	27	13	162	34	118	10	1	2	6	367	2 2	—	(b) 25.9 oz.
		Banteer,	,,	202	6 4	6 4	10	—	15	12	17	19	23	24	21	23	19	10	193	142	48	3	—	22	66	454	2 5	—	
		Co. Cork.	,,	203	5 5	6 7	—	—	6	7	18	20	21	21	24	22	24	9	172	89	82	1	1	5	15	399	2 3	—	(c) 1,972 Points
			,,	204	5 12	7 10	—	17	12	17	15	16	11	7	—	—	—	—	95	5	57	33	2	13	39	133	2 0	—	
23	34	Mrs. E. M. Mercier,	Feb. 26	193	5 1	6 0	1	21	22	19	22	21	21	24	17	20	20	5	213	5	194	14	2	38	114	474	2 1	—	(a) 1,043 Eggs
		Hazeldene,	,,	194	5 10	D	16	21	10	—	—	7	21	13	—	—	D	—	88	3	29	56	—	9	27	73	1 15	1	
		Ennis Road,	,,	195	5 4	6 4	10	23	15	20	20	20	21	23	10	15	11	10	198	69	119	10	1	41	123	450	2 2	1	(b) 25.4 oz.
		Limerick.	,,	196	6 5	7 4	—	—	17	8	18	20	20	15	18	18	12	10	156	154	2	—	1	17	51	366	2 9	—	
			,,	197	5 11	6 14	—	—	16	17	1	15	23	24	22	18	17	11	164	8	140	16	2	4	12	338	2 1	—	(c) 1,944 Points
			,,	198	5 0	5 12	18	24	19	20	20	14	24	23	21	14	19	8	224	4	95	125	1	28	81	243	1 10	1	
24	50	Mrs. J. McCarthy,	Mar. 1	283	4 10	5 8	—	6	23	24	24	27	25	22	21	22	20	11	225	50	170	5	—	28	84	520	2 2	—	(a) 1,290 Eggs
		Caherelly Castle,	,,	284	4 8	6 0	—	—	10	24	25	24	25	26	20	18	19	10	201	—	11	190	—	3	9	28	1 12	—	
		Grange,	,,	285	4 14	6 12	—	5	26	24	25	25	23	24	20	22	18	9	221	—	73	148	3	9	27	176	1 15	—	(b) 24.5 oz.
		Kilmallock,	,,	286	4 10	6 4	—	17	27	26	23	24	26	25	25	23	9	9	234	2	63	169	1	28	84	167	1 15	—	
		Co. Limerick.	,,	287	4 9	5 15	—	17	20	21	24	27	24	28	16	22	16	11	226	123	100	3	—	35	105	530	2 4	—	(c) 1,846 Points
			,,	288	4 8	7 0	5	19	23	8	19	25	25	21	12	16	8	2	183	144	39	—	6	47	141	425	2 5	—	
25	29	Miss B. Walsh,	February	163	5 11	5 1	15	8	23	22	23	24	20	24	15	15	8	—	200	31	163	6	—	46	138	456	2 2	1	(a) 1,173 Eggs
		Killountain,	,,	164	6 2	6 14	—	9	20	—	17	23	25	21	9	17	20	12	173	162	11	—	—	29	87	424	2 6	2	
		Bandon,	,,	165	5 9	6 5	23	25	25	24	24	24	25	25	17	9	9	14	244	—	5	239	—	1	3	12	1 12	1	(b) 24.3 oz.
		Co. Cork.	,,	166	6 0	6 8	[illegible]	—	18	16	21	23	23	20	17	16	9	4	184	1	87	96	—	12	36	204	1 14	3	
			,,	167	5 9	5 2	18	6	6	20	11	25	16	16	19	12	8	—	157	4	118	35	—	19	57	277	2 0	5	(c) 1,831 Points
			,,	168	6 4	6 15	18	19	17	16	17	16	21	21	21	19	20	10	215	9	180	26	1	37	111	458	2 1	—	

D = Dead.

SECTION III.—RHODE ISLAND RED—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1948	No. of Bird	Weight: On Arrival lb. oz.	Weight: At Close of Test lb. oz.	Eggs Laid: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs oz. dr.	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
26	20	Mrs. E. Gallagher,	April 4	121	6 3	7 8	23	14	19	20	23	19	20	18	16	11	12	—	195	57	115	23	—	33	99	400	2 2	1	(a) 1,018 Eggs
		Urney House,	,,	122	5 15	6 4	18	10	16	13	14	15	16	17	17	22	18	6	182	30	123	29	—	16	48	368	2 1	—	
		Tallaght,	,,	123	4 15	6 4	26	7	—	9	14	15	14	25	15	10	5	9	149	3	31	115	—	—	—	80	1 14	3	(b) 25.0 oz.
		Co. Dublin.	,,	124	5 12	6 12	5	5	8	—	17	24	19	17	18	17	23	7	160	11	105	44	—	9	27	274	2 1	—	
			,,	125	5 5	D	18	21	18	13	3	23	D	—	—	—	—	—	96	1	14	81	—	2	6	32	1 13	—	(c) 1,706 Points
			,,	126	7 0	8 8	10	19	22	25	17	24	22	23	23	23	16	12	236	179	53	4	4	47	141	552	2 5	—	
27	30	Miss B. Walsh,	February	169	5 15	D	18	20	16	—	4	24	16	18	9	D4	—	—	129	56	72	1	—	54	162	314	2 3	4	(a) 747 Eggs
		Killountain,	,,	170	6 4	7 4	16	23	20	19	24	19	22	19	12	9	18	—	201	30	150	21	—	55	165	440	2 1	3	
		Bandon,	,,	171	5 10	6 7	14	—	—	18	23	22	22	16	22	—	3	12	152	123	29	—	—	14	42	333	2 4	1	(b) 26.4 oz.
		Co. Cork.	,,	172	5 15	7 0	21	23	22	20	22	21	22	15	15	12	8	3	204	147	57	—	1	66	198	495	2 5	—	
			,,	173	5 3	D	10	—	—	D	—	—	—	—	—	—	—	—	10	—	—	10	—	—	—	—	1 12	—	(c) 1,705 Points
			,,	174	4 9	D	—	15	11	9	12	D4	—	—	—	—	—	—	51	16	33	2	—	25	75	123	2 2	—	
28	38	Capt. H. M. S. Redmond,	Feb. 19	211	5 6	6 6	21	22	20	13	—	9	23	24	16	7	25	12	192	—	8	184	—	—	—	19	1 12	2	(a) 1,233 Eggs
		Popefield,	,,	212	7 2	8 1	14	20	20	21	19	17	23	22	14	9	21	—	200	2	88	110	1	5	15	209	1 15	1	
		Athy,	,,	213	5 6	6 8	22	22	21	18	21	20	21	21	20	19	19	8	232	1	105	126	1	7	21	247	1 15	—	(b) 23.9 oz.
		Co. Kildare.	,,	214	5 9	5 14	—	—	7	16	21	21	23	20	13	13	2	—	136	65	68	3	—	7	21	285	2 3	1	
			,,	215	5 8	6 13	—	8	26	25	21	25	26	23	20	21	21	11	227	32	179	16	—	34	102	499	2 2	—	(c) 1,701 Points
			,,	216	6 0	6 4	21	23	18	21	22	20	24	27	21	20	20	9	246	22	157	67	1	57	171	442	2 0	—	
29	23	Mrs. E. Gallagher,	April 14	127	4 10	5 8	25	25	22	21	23	22	24	23	18	19	24	9	255	15	174	66	—	25	75	450	2 1	—	(a) 1,095 Eggs
		Urney House,	,,	128	4 12	5 4	—	—	—	16	17	11	12	24	22	3	19	—	124	52	71	1	—	—	—	267	2 3	1	
		Tallaght,	,,	129	5 6	6 8	21	25	23	21	24	23	21	25	20	12	15	10	240	6	45	189	—	2	6	129	1 14	1	(b) 25.4 oz.
		Co. Dublin.	,,	130	6 0	7 10	12	16	4	4	20	18	20	27	21	16	5	6	169	26	103	40	—	19	57	298	2 1	—	
			,,	131	6 8	D	15	13	19	14	17	21	d11	—	—	—	—	—	110	10	15	85	—	7	21	57	1 15	—	(c) 1,665 Points
			,,	132	5 8	6 8	14	—	—	18	18	22	22	25	19	23	24	12	197	193	4	—	1	14	42	464	2 9	—	
30	39	Mrs. E. O'Donnell,	March	217	5 4	D	—	—	6	25	19	22	16	11	8	D	—	—	107	79	28	—	—	6	18	220	2 5	—	(a) 905 Eggs
		Kilbreedy West,	,,	218	5 7	7 0	—	—	—	12	23	25	27	26	24	21	23	10	191	175	14	2	—	—	—	432	2 6	—	
		Kilmallock,	,,	219	6 4	9 8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	(b) 24.9 oz.
		Co. Limerick.	,,	220	5 6	7 3	—	1	24	20	21	23	21	23	21	20	21	8	203	6	109	88	1	4	12	273	2 0	—	
			,,	221	5 2	6 8	17	18	16	1	—	3	25	26	23	25	21	10	185	8	85	92	—	40	120	252	2 0	—	(c) 1,240 Points
			,,	222	4 14	6 8	22	22	23	21	21	19	17	20	17	16	12	9	219	—	29	190	3	2	6	63	1 14	—	

D = Dead.

SECTION IV.—RHODE ISLAND RED (STATION HOLDERS)—27 Pens.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1948	No. of Bird	Weight: On Arrival lb. oz.	Weight: At Close of Test lb. oz.	Eggs Laid: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs oz. dr.	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
1	58	Mrs. M. A. Kelly,	Feb. 14	325	5 3	6 4	—	1	23	9	17	21	25	25	21	24	25	13	204	200	4	—	—	24	72	494	2 5	—	(a) 1,216 Eggs
		Carronstown,	,,	326	5 0	6 7	—	12	20	20	22	24	25	28	5	16	13	14	199	192	6	1	—	32	96	471	2 7	2	
		Ballivor,	,,	327	5 0	6 8	7	12	23	20	24	24	25	27	20	24	21	13	240	190	49	1	—	41	123	577	2 5	—	(b) 27.7 oz.
		Co. Meath.	,,	328	5 2	7 0	—	9	23	9	24	24	26	26	20	20	19	11	211	205	6	—	—	32	96	504	2 6	—	
			,,	329	5 2	7 1	—	10	21	2	23	23	25	26	27	24	24	11	216	158	56	2	1	31	93	516	2 4	—	(c) 2,883 Points
			Jan. 21	330	5 4	5 5	—	—	7	16	20	24	24	25	6	9	15	—	146	68	77	1	—	7	21	321	2 1	2	
2	83	Miss C. Mealiff,	Mar. 23	451	4 14	5 15	12	16	13	16	22	16	18	19	20	22	15	6	·195	120	68	7	—	35	105	454	2 4	—	(a) 1,205 Eggs
		Ballinamona House,	,,	452	5 9	6 0	—	—	7	23	21	22	23	24	23	24	6	—	173	70	101	2	—	5	15	377	2 3	—	
		Tullamore,	,,	453	5 8	5 9	12	22	19	17	16	18	19	15	14	19	14	9	194	154	38	2	1	51	153	475	2 5	—	(b) 26.9 oz.
		Offaly.	,,	454	5 12	6 13	16	19	18	16	19	21	22	23	17	20	14	6	211	108	99	4	—	50	150	503	2 3	—	
			,,	455	6 3	7 9	14	—	18	18	18	20	23	25	19	19	17	10	201	158	39	4	—	29	87	469	2 5	—	(c) 2,841 Points
			,,	456	5 4	6 8	21	22	20	19	18	18	22	21	20	19	23	8	231	164	63	4	—	59	177	563	2 4	—	
3	61	Mrs. A. E. Edwards,	Jan. 27	343	5 12	4 12	20	24	22	22	21	21	26	12	7	5	—	—	180	2	159	19	1	53	159	378	2 2	—	(a) 1,229 Eggs
		Hillsboro' House,	,,	344	5 8	6 8	—	—	11	7	16	21	25	27	19	20	25	12	183	155	28	—	—	11	33	434	2 5	—	
		Ramelton,	,,	345	5 12	6 4	20	25	24	21	24	26	24	20	17	7	—	—	208	12	189	7	2	65	195	469	2 1	1	(b) 25.9 oz.
		Co. Donegal.	,,	316	6 4	6 8	17	21	22	21	21	23	25	28	21	12	18	10	239	61	176	2	—	59	177	572	2 2	—	
			,,	347	5 7	6 7	7	15	18	15	10	15	19	22	21	23	14	11	190	151	39	—	4	40	120	457	2 4	—	(c) 2,830 Points
			,,	348	6 0	6 0	24	26	20	20	22	21	22	23	10	18	16	7	229	22	190	17	—	56	168	520	2 1	1	
4	54	Mrs. M. F. Smith,	February	301	6 9	6 12	21	22	16	17	21	21	22	17	19	9	18	2	205	103	95	7	—	54	162	478	2 3	1	(a) 1,243 Eggs
		Bridge House,	,,	302	5 0	7 4	—	16	23	22	22	24	25	22	24	23	20	11	232	33	187	12	1	32	96	522	2 2	—	
		Bettystown,	,,	303	5 5	6 4	24	20	22	21	20	20	24	24	18	22	20	9	244	52	189	3	—	63	189	596	2 2	—	(b) 26.1 oz.
		Co. Meath.	,,	304	5 8	7 4	—	20	15	—	11	25	25	16	—	—	4	1	117	7	84	26	—	22	66	205	2 1	—	
			,,	305	5 2	6 5	—	—	9	20	23	25	26	24	21	26	24	10	208	55	145	8	10	8	24	433	2 2	—	(c) 2,815 Points
			,,	306	5 12	6 12	18	21	18	21	18	21	20	26	24	22	18	10	237	234	3	—	—	57	171	581	2 6	—	
5	68	Miss M. O'Donovan,	Jan. 22	379	5 11	6 8	21	15	—	2	23	22	24	25	19	21	21	9	202	11	161	30	—	10	30	405	2 1	—	(a) 1,277 Eggs
		Dromore,	,,	380	5 5	5 8	17	18	22	21	20	23	27	22	22	20	16	—	228	15	177	36	1	29	87	445	2 1	—	
		Villierstown,	Feb. 20	381	5 2	6 9	22	23	20	20	21	23	22	23	19	22	23	14	252	45	192	15	1	57	171	585	2 2	—	(b) 25.7 oz.
		Cappoquin,	,,	382	5 5	6 9	—	11	16	12	14	14	14	20	8	9	17	7	142	90	42	10	1	27	81	311	2 4	1	
		Co. Waterford.	Mar. 18	383	5 2	5 8	12	—	20	16	17	22	23	26	20	22	20	10	208	164	43	1	2	31	90	491	2 4	—	(c) 2,786 Points
			,,	384	5 0	6 2	22	9	23	20	18	23	24	26	24	20	23	13	245	87	141	17	—	37	111	549	2 3	—	

SECTION IV.—RHODE ISLAND RED (STATION HOLDERS)—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1948	No. of Bird	Weight: On Arrival lb.	oz.	Weight: At Close of Test lb.	oz.	Eggs Laid: Oct. 1–Oct 28	Oct 29–Nov. 25	Nov. 26–Dec 23	Dec. 24–Jan 20	Jan 21–Feb 17	Feb 18–Mar. 17	Mar 18–Apl 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug 4	Aug 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring Special and First Grade	Special and First Grade—Oct 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs oz	dr	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
6	57	Mrs M J. Doyle,	January	319	4	15	5	8	22	23	21	22	20	23	23	21	21	19	16	10	241	4	107	130	—	7	21	256	1	15	—	(a) 1,310 Eggs
		Carrigeen,	,,	320	5	0	6	8	22	22	24	20	21	22	22	22	17	21	18	4	235	10	205	20	1	50	150	519	2	1	—	
		Baltinglass.	,,	321	5	8	7	0	23	21	23	23	17	17	21	25	22	21	22	11	246	230	16	—	—	67	201	613	2	5	—	(b) 26.3 oz.
		Co Wicklow.	,,	322	4	10	7	2	—	—	—	9	23	27	23	22	20	22	21	7	174	153	21	—	—	—	—	398	2	5	—	
			,,	323	5	9	7	6	—	9	22	23	21	22	22	24	25	20	24	12	224	187	37	—	—	31	93	535	2	5	—	(c) 2,758 Points
			,,	324	5	7	7	2	—	—	—	13	25	24	23	27	25	25	21	11	190	95	95	—	—	—	—	437	2	4	—	
7	66	Mrs. B McAuliffe,	Mar. 1	367	4	14	6	4	—	24	25	26	19	26	25	20	13	4	8	4	194	161	32	1	1	48	144	448	2	5	1	(a) 1,191 Eggs
		Farrihy,	,,	368	4	12	7	8	9	23	20	21	21	21	21	25	22	20	18	6	227	53	169	5	5	50	150	525	2	2	—	
		Broadford,	,,	369	5	0	6	10	12	23	21	21	20	21	23	27	24	21	22	9	240	220	19	1	5	55	159	571	2	5	—	(b) 26.7 oz.
		Charleville,	,,	370	4	8	4	15	—	4	22	23	23	24	26	26	19	11	2	—	180	18	153	9	—	24	72	377	2	2	1	
		Co. Limerick	,,	371	4	12	5	12	—	—	—	13	19	20	26	24	21	17	12	3	155	41	112	2	2	—	—	331	2	2	—	(c) 2,708 Points
			,,	372	5	2	6	8	15	25	25	23	23	25	23	26	—	6	4	—	195	163	31	1	2	65	192	456	2	5	—	
8	84	Miss M. Murphy,	Feb 15	547	5	13	D		24	25	26	27	25	28	25	24	3	—	—	D	205	57	146	2	—	75	225	481	2	2	1	(a) 1,153 Eggs
		Valley View House,	,,	548	6	8	7	0	—	3	17	4	19	21	24	22	15	17	23	6	171	44	120	7	—	20	60	392	2	2	—	
		Coolduv,	,,	549	6	12	8	0	18	23	21	23	19	21	23	6	15	12	6	8	195	42	145	8	—	58	174	456	2	2	2	(b) 26 4 oz.
		Lissarda,	,,	550	5	14	6	10	9	4	20	20	14	21	22	2[illegible]	25	[illegible]	27	14	221	67	148	6	—	32	96	524	2	3	—	
		Co Cork	,,	551	7	0	5	12	12	23	21	23	24	20	25	24	23	21	—	—	216	123	92	1	—	55	165	506	2	3	—	(c) 2,679 Points
			,,	552	7	4	7	0	16	—	—	21	20	22	24	14	14	14	—	—	145	143	2	—	—	16	48	320	2	8	1	
9	55	Mr. D. H. Edwards,	Jan. 29	307	6	0	6	10	17	10	16	19	21	20	19	21	21	15	6	3	188	184	4	—	3	43	129	436	2	7	—	(a) 1,078 Eggs
		Drumgowan,	,, 17	308	6	9	8	0	25	25	21	21	18	20	22	15	19	11	14	12	221	220	1	—	1	71	213	547	2	7	1	
		Burt,	,, ,,	309	6	8	8	8	24	21	21	20	21	21	15	—	—	—	13	6	162	132	29	1	—	66	198	406	2	4	—	(b) 28.7 oz.
		Speenogue P.O.,	,, ,,	310	6	12	8	12	18	14	20	—	—	—	—	—	—	—	—	—	52	52	—	—	—	52	156	156	2	7	—	
		Co. Donegal.	,, ,,	311	6	10	7	4	21	21	22	21	[illegible]	[illegible]	20	17	20	18	18	9	232	211	21	—	—	64	192	573	2	5	—	(c) 2,647 Points
			Feb. 20	312	6	4	6	9	18	25	22	23	18	14	[illegible]	[illegible]	22	19	7	9	223	222	1	—	6	65	195	529	2	8	—	
10	73	Mrs. D. Philpott,	April	397	6	2	7	10	4	17	18	18	17	20	25	25	24	18	22	9	217	97	116	4	—	35	105	510	2	3	—	(a) 1,199 Eggs
		Charlesfield,	,,	398	6	0	8	0	8	20	19	18	19	18	21	22	21	21	18	10	215	139	72	4	1	43	129	511	2	3	—	
		Lyre,	,,	399	5	12	5	8	21	19	20	21	23	24	25	25	25	10	19	—	232	37	170	25	—	37	111	479	2	2	1	(b) 25.7 oz.
		Banteer,	,,	400	5	8	6	0	—	—	—	3	20	20	22	23	19	21	20	11	179	109	59	—	—	—	—	370	2	4	—	
		Co. Cork.	,,	401	5	9	5	8	19	17	20	20	20	19	19	22	21	22	21	8	228	9	188	31	—	27	81	470	2	1	—	(c) 2,636 Points
			,,	402	5	8	5	4	—	—	5	21	21	19	24	25	18	17	—	—	148	5	136	7	—	2	6	296	2	1	—	

D = Dead.

Bird No. 92 (Pen No. 14, White Wyandotte) owned by Mr. J. Lynch, Cooldoney, Abbeylara, Co. Longford, awarded the Special Prize for the Bird (Sitting Breed) scoring the highest number of Points during the Test.

SECTION IV.—RHODE ISLAND RED (STATION HOLDERS)—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1948	No. of Bird	Weight: On Arrival lb. oz.	Weight: At Close of Test lb. oz.	Eggs Laid: Oct. 1-Oct. 28	Oct. 29-Nov. 25	Nov. 26-Dec. 23	Dec. 24-Jan. 20	Jan. 21-Feb. 17	Feb. 18-Mar. 17	Mar. 18-Apl. 14	Apl. 15-May 12	May 13-June 9	June 10-July 7	July 8-Aug. 4	Aug. 5-Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring Special and First Grade	Special and First Grade—Oct. 1-Dec. 23	Scoring Points: Oct. 1-Dec. 23	Full Period	Average Weight of Eggs oz. dr.	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
11	79	Miss M. Mulcahy, Abbey View, Clonmel, Co. Waterford.	Feb. 3	433	6 3	9 8	—	—	12	22	24	23	21	15	14	12	17	9	169	138	30	1	2	12	36	381	2 5	1	(a) 1,102 Eggs
			February	434	5 9	6 0	13	22	21	23	19	10	5	17	16	19	22	4	191	138	53	—	12	56	168	447	2 4	1	
			,,	435	5 8	5 11	9	15	7	19	—	23	14	18	9	—	17	6	137	3	89	45	—	13	39	214	2 0	1	(b) 26.5 oz.
			,,	436	5 5	7 9	—	3	18	20	19	19	21	18	14	9	20	5	166	149	17	—	1	21	63	384	2 5	1	
			,,	437	5 10	6 8	22	19	20	18	18	20	23	24	19	22	16	9	230	162	65	3	1	59	177	557	2 4	—	(c) 2,488 Points
			,,	438	5 8	7 0	17	21	17	18	17	21	22	22	22	22	10	—	209	128	81	—	—	55	165	505	2 2	—	
12	82	Mrs. C. Healy, Clonmeen, Banteer, Co. Cork.	February	445	6 0	D	—	—	13	16	11	13	23	16	15	—	D	—	107	83	24	—	—	13	39	227	2 5	1	(a) 1,033 Eggs
			,,	446	6 4	7 8	20	18	19	17	17	20	20	21	17	10	—	—	179	177	2	—	1	57	171	422	2 7	—	
			,,	447	5 12	6 12	—	12	19	16	22	22	23	23	20	23	18	9	207	154	53	—	—	31	93	495	2 4	—	(b) 27.1 oz.
			,,	448	5 10	6 11	—	—	14	25	25	25	24	20	14	18	18	—	181	133	48	—	—	14	42	412	2 4	—	
			,,	449	5 12	D	23	22	21	21	23	18	1	D	—	—	—	—	129	25	87	17	—	50	150	274	2 1	—	(c) 2,366 Points
			,,	450	5 8	7 8	—	15	22	26	23	23	21	25	25	21	17	9	230	105	123	2	1	37	111	536	2 3	—	
13	56	Mrs. M. Galvin, Cripple Hill, Bandon, Co Cork.	Feb. 4	313	6 0	D	—	—	—	6	17	23	24	D2	—	—	—	—	72	40	31	1	—	—	—	142	2 4	—	(a) 1,070 Eggs
			,, ,,	314	6 8	8 3	—	19	24	15	19	22	26	27	19	22	23	10	226	4	161	61	—	38	114	401	2 0	—	
			,, ,,	315	6 1	7 15	—	—	11	19	22	20	21	25	24	24	28	11	205	33	165	7	—	11	33	468	2 2	—	(b) 25.8 oz.
			,, 10	316	6 10	8 1	6	—	2	17	19	23	23	25	22	23	23	10	193	86	107	—	—	8	24	450	2 3	—	
			,, ,,	317	6 2	7 15	—	—	16	22	20	23	16	21	22	21	21	10	192	151	40	1	—	15	45	449	2 5	—	(c) 2,329 Points
			,, 4	318	5 0	6 0	—	—	—	—	22	25	24	26	24	25	25	11	182	45	135	2	—	—	—	419	2 2	—	
14	59	Miss N. Moore, Churchtown, Churchland Quarters, Carndonagh, Co. Donegal.	Jan 15	331	5 0	D	5	—	6	—	10	15	18	10	10	17	D	—	91	12	76	3	5	10	30	188	2 2	—	(a) 991 Eggs
			,,	332	5 0	7 4	13	21	5	—	17	21	20	20	15	13	8	5	158	145	13	—	—	59	117	381	2 6	2	
			,,	333	5 4	6 4	16	22	20	23	22	21	22	23	20	19	20	3	231	67	162	2	1	56	168	553	2 2	—	(b) 26.1 oz.
			,,	334	5 0	6 2	20	23	18	22	22	21	16	16	18	16	15	6	213	115	93	5	—	56	168	509	2 3	—	
			,,	335	5 0	D	—	12	14	25	13	8	6	—	—	—	—	D	78	11	64	3	1	23	66	170	2 2	—	(c) 2,319 Points
			,,	336	5 2	5 12	15	25	24	25	25	19	23	27	6	24	7	—	220	44	169	7	1	64	192	518	2 2	—	
15	75	Mrs. E. McDonnell, Emula, Ballyferriter, Dingle, Co. Kerry.	Jan. 22	409	4 12	D	13	—	5	12	—	D	—	—	—	—	—	—	30	—	13	17	—	4	12	30	1 15	—	(a) 1,004 Eggs
			,,	410	5 3	6 8	—	—	—	16	21	21	23	22	21	24	23	11	182	180	2	—	1	—	—	419	2 7	—	
			Feb. 18	411	4 8	6 11	[illegible]	5	22	21	21	22	26	25	19	23	19	7	219	40	171	8	—	35	105	506	2 2	—	(b) 26.3 oz.
			Jan. 27	412	4 12	6 6	19	18	16	19	16	19	22	22	23	18	5	2	199	96	100	3	1	51	153	465	2 3	—	
			,, 22	413	4 14	6 8	9	—	15	22	20	22	22	23	23	22	13	12	203	79	124	—	—	24	72	477	2 3	—	(c) 2,286 Points
			—	414	5 2	6 8	19	22	21	20	19	19	19	15	8	—	3	6	171	14	147	10	—	58	174	389	2 1	—	

D = Dead.

SECTION IV.—RHODE ISLAND RED (STATION HOLDERS)—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1948	No. of Bird	Weight: On Arrival (lb. oz.)	Weight: At Close of Test (lb. oz.)	Eggs Laid: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs (oz. dr.)	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
16	60	Mr. M. Fitzgibbon,	Feb. 27	337	5 7	6 0	3	15	18	12	19	19	24	22	1	19	22	—	174	163	10	1	—	35	105	422	2 6	1	(a) 993 Eggs
		Gurrane,	,,	338	6 2	4 15	4	—	—	14	16	18	23	26	3	18	1	—	123	68	53	2	—	4	12	265	2 4	2	
		Kilmeedy,	,,	339	5 6	6 0	15	6	—	16	23	20	22	21	17	13	14	9	176	42	112	22	3	13	39	340	2 2	—	(b) 26.6 oz.
		Co. Limerick.	,,	340	6 5	8 8	—	8	23	26	24	24	27	27	21	22	19	10	231	74	154	3	1	29	87	533	2 3	—	
			,,	341	5 8	6 4	—	—	—	12	22	23	25	26	22	19	21	11	181	87	93	1	—	—	—	411	2 3	—	(c) 2,196 Points
			,,	342	6 2	D	—	—	16	—	5	24	28	27	8	D	—	—	108	24	81	3	—	15	45	225	2 2	—	
17	72	Mrs. M. Kennedy,	Jan. 28	391	5 5	6 12	—	—	—	12	23	24	25	25	23	23	25	9	189	2	121	66	—	—	—	281	2 0	—	(a) 1,146 Eggs
		Kilderry House,	,,	392	5 12	7 2	13	4	—	4	18	20	23	25	21	19	18	10	175	—	63	112	—	6	18	144	1 15	—	
		Fedamore,	,,	393	5 8	D	—	9	14	25	6	18	12	9	12	8	D	—	113	78	35	—	17	23	69	217	2 4	—	(b) 25.0 oz.
		Co. Limerick.	,,	394	5 8	7 8	24	22	22	20	20	21	20	21	22	22	17	7	238	45	187	6	1	62	186	570	2 2	—	
			,,	395	5 4	D	9	—	11	20	19	23	22	24	21	20	D8	—	177	3	145	29	—	14	42	334	2 1	—	(c) 2,130 Points
			,,	396	5 8	6 3	22	20	23	20	24	21	26	24	21	20	24	9	254	99	141	14	1	56	168	584	2 3	—	
18	78	Mrs. L. Hayes,	Mar. 2	427	5 1	7 4	—	9	26	19	25	25	23	26	22	20	19	7	221	4	127	90	—	28	84	321	2 0	—	(a) 1,044 Eggs
		Walshestown,	,,	428	4 12	D	—	—	13	22	20	23	21	20	d10	—	—	—	129	8	101	20	—	7	21	225	2 1	—	
		Castlemahon,	,,	429	5 6	6 12	11	3	24	22	19	22	26	26	23	21	20	10	227	11	198	18	—	24	72	493	2 1	—	(b) 25.3 oz.
		Newcastle West,	,,	430	5 6	5 6	20	4	20	6	19	24	26	23	17	14	23	3	199	112	83	4	1	43	129	470	2 4	2	
		Co. Limerick.	,,	431	5 5	7 2	5	—	19	26	24	24	28	26	19	12	22	12	217	34	175	8	—	19	57	481	2 2	2	(c) 2,108 Points
			,,	432	4 8	7 0	—	10	8	6	10	17	—	—	—	—	—	—	51	46	5	—	1	18	54	118	2 6	—	
19	64	Mrs. O. Hodgins,	Jan 30	355	5 8	6 2	25	22	22	20	22	24	27	26	26	25	27	11	277	4	201	72	1	25	75	487	2 0	—	(a) 986 Eggs
		Roselawn,	,, 17	356	5 0	D	—	D	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
		Cloughjordan,	,, ,,	357	6 2	D	13	22	21	19	21	11	7	D	—	—	—	—	114	97	14	3	3	53	159	269	2 4	—	(b) 26.2 oz.
		Co. Tipperary.	,, 30	358	5 12	6 14	16	18	17	21	23	24	23	23	15	16	15	8	219	188	31	—	14	51	153	487	2 5	—	
			,, 17	359	5 11	5 12	7	21	18	20	20	20	19	22	19	10	—	—	176	167	9	—	2	46	138	402	2 5	—	(c) 2,092 Points
			,, 17	360	6 0	D	25	23	22	24	25	25	22	24	10	D	—	—	200	41	150	9	2	69	207	447	2 2	—	
20	62	Rev. Bro. P. Regan, O.M.I.,	Mar. 3	349	6 12	8 8	4	—	—	15	18	23	22	23	15	8	4	5	137	118	19	—	—	4	12	295	2 5	1	(a) 1,005 Eggs
		Our Lady of Lourdes,	,,	350	7 0	8 1	—	—	—	—	4	18	19	9	21	20	20	7	118	112	6	—	—	—	—	283	2 6	—	
		Cahermoyle,	,,	351	5 8	5 8	—	—	8	23	24	13	24	26	15	17	—	—	150	51	98	1	—	8	24	323	2 3	1	(b) 27.1 oz.
		Ardagh,	,,	352	6 0	7 8	1	5	18	15	21	20	23	23	17	9	7	—	159	101	57	1	—	23	69	355	2 2	1	
		Co. Limerick.	,	353	6 4	6 15	19	19	21	17	21	24	21	22	18	18	10	8	218	216	2	—	—	59	177	531	2 9	—	(c) 2,081 Points
			,,	354	6 8	7 1	10	—	13	24	20	22	22	24	27	24	25	12	223	3	122	98	—	6	18	294	2 0	—	

SECTION IV.—RHODE ISLAND RED (STATION HOLDERS)—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1948	No. of Bird	Weight On Arrival lb. oz.	Weight At Close of Test lb. oz.	Eggs Laid Oct. 1-Oct. 28	Oct. 29-Nov. 25	Nov. 26-Dec. 23	Dec. 24-Jan. 20	Jan 21-Feb. 17	Feb. 18-Mar. 17	Mar 18-Apl. 14	Apl 15 May 12	May 13-June 9	June 10-July 7	July 8 Aug 4	Aug 5-Aug 18	Total	Grading Special Grade	First Grade	Under First Grade	Non-Scoring Special and First Grade	Special and First Grade—Oct. 1-Dec. 23	Scoring Points Oct. 1-Dec. 23	Full Period	Average Weight of Eggs oz. dr.	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
21	65	Mrs. J. Hyde,	Mar. 15	361	6 2	6 9	22	23	24	19	21	22	23	25	22	22	21	10	254	206	48	—	—	69	207	630	2 4	—	(a) 879 Eggs
		Killeens Farm.	Feb. 20	362	7 2	6 3	10	13	20	12	20	16	23	23	15	18	—	—	170	170	—	—	3	43	126	393	2 8	1	
		Cork	Mar. 10	363	6 13	7 3	7	15	11	—	9	21	21	25	25	25	23	9	191	26	134	31	—	26	78	393	2 1	—	(b) 27.3 oz.
			—	364	5 14	D	6	D	—	—	—	—	—	—	—	—	—	—	6	—	3	3	—	3	9	9	1 15	—	
			Mar 1	365	7 0	7 4	—	14	1	5	12	18	22	26	22	23	26	14	183	133	47	3	—	13	39	436	2 4	—	(c) 2,042 Points
			Feb. 4	366	6 8	8 8	2	21	10	9	11	14	7	—	—	—	—	1	75	66	9	—	1	33	99	181	2 5	1	
22	70	Mrs. M. Reynolds,	Feb 21	385	4 11	6 4	20	19	—	—	14	26	28	27	27	11	20	1	193	130	62	1	—	39	117	455	2 4	1	(a) 911 Eggs
		Racefield,	,,	386	5 0	D	—	6	3	D	—	—	—	—	—	—	—	—	9	9	—	—	—	9	27	27	2 5	—	
		Mungret,	,,	387	5 9	7 1	—	—	13	23	24	8	24	15	17	10	20	—	154	146	8	—	—	13	39	351	2 7	3	(b) 27.3 oz.
		Limerick	,,	388	5 4	6 14	—	9	22	20	21	23	26	17	11	1	—	5	155	57	93	5	—	31	93	336	2 3	1	
			,,	389	5 0	6 4	22	24	23	23	22	19	23	25	22	12	—	—	215	29	151	35	—	42	126	414	2 1	1	(c) 2,009 Points
			,,	390	5 1	7 2	—	—	8	20	18	22	22	22	25	19	22	7	185	180	5	—	—	8	24	426	2 8	—	
23	77	Mrs. E. O'Donnell,	March	421	5 8	7 4	—	6	23	21	22	23	22	24	23	24	27	12	227	2	201	24	—	25	75	487	2 1	—	(a) 1,144 Eggs
		Kilbreedy West.	,,	422	5 12	7 4	23	24	20	23	19	18	15	7	—	—	—	7	156	57	85	14	—	54	162	345	2 2	—	
		Kilmallock,	,,	423	6 2	7 6	8	16	2	—	2	21	18	22	19	18	21	9	156	—	42	114	—	—	—	107	1 14	—	(b) 24.4 oz.
		Co Limerick	,,	424	5 4	6 0	27	27	22	18	3	6	24	28	16	19	19	6	215	2	79	134	1	—	—	189	1 15	—	
			,,	425	5 12	6 8	—	—	10	21	22	21	25	23	22	24	15	9	192	52	139	1	1	9	27	437	2 3	—	(c) 1,934 Points
			,,	426	5 6	6 12	5	6	21	26	22	25	24	19	16	18	16	—	198	20	147	31	3	10	30	369	2 1	—	
24	74	Mrs. M. Fahy,	February	403	4 8	D	5	17	16	22	5	9	25	26	24	21	d19		192	27	159	6	—	38	114	451	2 2	—	(a) 937 Eggs
		Corbally,	,,	404	5 3	6 0	13	11	9	—	6	11	—	—	—	—	—	—	50	32	18	—	1	33	96	130	2 3	—	
		Ballyglunin,	,,	405	5 7	6 14	23	23	25	24	25	26	26	5	14	12	15	—	218	22	175	21	15	70	204	443	2 1	2	(b) 25.1 oz.
		Co. Galway.	,,	406	5 0	5 12	12	24	23	21	24	20	21	12	21	9	9	2	198	94	100	4	—	57	171	465	2 3	2	
			,,	407	5 0	D	25	26	26	26	26	27	20	25	26	23	d15	—	265	20	146	99	5	36	108	389	2 0	—	(c) 1,917 Points
			,,	408	5 12	D	9	D5	—	—	—	—	—	—	—	—	—	—	14	7	6	1	—	13	39	39	2 1	—	
25	81	Mrs. S Collier,	February	439	5 11	7 5	23	—	14	26	23	26	23	20	22	24	25	8	234	6	162	66	2	27	81	391	2 0	—	(a) 985 Eggs
		Boggan,	,,	440	5 14	6 12	19	—	—	6	19	21	23	25	22	22	21	10	188	5	129	54	2	3	9	314	2 0	—	
		Kilbride,	,,	441	6 3	5 14	15	5	24	23	22	23	24	20	27	16	8	—	207	6	143	58	—	23	69	335	2 0	1	(b) 24.8 oz.
		Tullow,	,,	442	5 9	6 3	8	11	24	26	23	24	24	19	20	21	21	14	235	60	171	4	1	41	123	556	2 2	—	
		Co. Carlow	,,	443	5 15	8 7	14	2	—	—	—	—	—	—	—	—	—	—	16	12	4	—	—	16	48	48	2 3	—	(c) 1,862 Points
			,,	444	5 9	7 0	16	2	9	20	21	22	13	2	—	—	—	—	105	55	44	6	1	22	66	218	2 3	—	

D = Dead.

SECTION IV.—RHODE ISLAND RED (STATION HOLDERS)—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1948	No. of Bird	Weight: On Arrival lb oz.	Weight: At Close of Test lb. oz.	Eggs Laid: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs oz dr.	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
26	76	Capt. H. M. S. Redmond,	Feb. 19	415	5 8	6 8	—	16	21	21	20	21	25	23	21	21	24	11	224	2	26	196	—	11	33	72	1 14	—	(a) 1,085 Eggs
		Popefield,	,,	416	5 12	6 8	—	22	20	—	16	22	21	23	23	7	17	—	171	9	81	81	—	36	108	221	1 15	—	
		Athy,	,,	417	5 13	7 6	21	22	19	20	11	10	22	23	20	24	22	11	225	98	117	10	1	54	162	537	2 3	—	(b) 24.5 oz.
		Co. Kildare.	,,	418	6 12	6 6	—	6	20	20	22	23	21	22	13	—	—	1	148	72	73	3	—	26	78	317	2 3	—	
			,,	419	5 9	D	10	23	20	19	1	—	D	—	—	—	—	—	73	6	60	7	—	49	147	181	2 1	—	(c) 1,811 Points
			,,	420	5 8	6 12	6	23	23	19	23	22	24	26	22	21	23	12	244	18	176	50	—	45	135	483	2 1	—	
27	67	Mrs. J. Casey,	Feb. 10	373	5 11	6 2	21	3	—	2	19	23	27	25	13	18	20	13	184	51	110	23	—	4	12	376	2 2	2	(a) 1,024 Eggs
		Foxfort,	,,	374	5 4	7 12	—	—	—	—	20	22	24	27	19	15	10	10	147	1	89	57	—	—	—	202	2 0	1	
		Bansha,	,,	375	5 6	7 14	—	—	—	18	20	24	24	21	25	26	23	13	194	118	76	—	—	—	—	450	1 15	—	(b) 24.3 oz.
		Co. Tipperary.	,,	376	6 8	7 8	17	20	22	12	20	22	26	21	16	21	15	5	217	79	130	8	3	54	159	504	2 3	1	
			,,	377	5 9	5 12	5	25	22	19	21	23	24	20	—	—	21	—	180	4	72	104	—	25	75	197	1 15	1	(c) 1,768 Points
			,,	378	4 13	D	6	19	20	17	16	16	8	D	—	—	—	—	102	—	17	85	—	5	15	39	1 14	—	

D = Dead.

SECTION V.—ANY NON-SITTING BREED—7 Pens.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1948	No. of Bird	Weight: On Arrival (lb. oz.)	Weight: At Close of Test (lb. oz.)	Eggs Laid: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs (oz. dr.)	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
1	89	*White Leghorn*	Feb. 17	655	4 9	4 12	24	19	19	14	22	20	21	21	18	21	18	10	227	148	79	—	1	62	186	562	2 4	—	(a) 1,242 Eggs
		Sister-in-Charge,	,,	656	4 3	4 12	21	23	18	19	20	23	20	10	24	23	23	11	235	194	39	2	2	60	180	578	2 5	—	(b) 26.7 oz.
		St. Martha's College,	,,	657	3 15	5 14	11	20	14	18	17	16	17	18	10	19	21	3	184	171	12	1	13	44	117	419	2 7	—	(c) 2,809 Points
		An Uaimh,	,,	658	4 0	4 8	—	—	19	18	18	11	17	20	16	16	20	9	164	44	96	24	—	2	6	327	2 2	—	
		Co. Meath.	Mar. 21	659	4 0	5 4	13	23	21	21	22	27	21	20	23	22	22	8	243	19	179	45	1	33	99	476	2 1	—	
			,,	660	3 10	5 12	13	20	19	16	19	21	22	22	17	10	5	5	189	124	64	1	—	51	153	447	2 4	—	
2	85	*White Leghorn*	April 27	631	5 6	6 8	18	22	2	10	23	25	25	24	23	23	23	8	226	171	39	16	2	28	84	497	2 4	—	(a) 1,204 Eggs
		Mr. J. H. Malcolm,	May 2	632	3 10	5 2	9	20	19	19	21	23	24	27	20	18	22	7	229	222	6	1	—	47	141	550	2 7	—	(b) 28.0 oz.
		Cahirleske,	,,	633	4 0	5 14	—	14	14	18	17	21	23	24	21	22	25	11	210	157	51	2	3	26	78	491	2 4	—	(c) 2,753 Points
		Callan,	,,	634	4 5	5 4	—	18	19	18	20	19	19	25	22	24	19	11	214	94	118	2	—	35	105	513	2 3	—	
		Co. Kilkenny.	,,	635	4 2	6 1	—	—	13	17	19	22	18	22	13	9	12	4	149	145	4	—	6	13	39	319	2 7	—	
			,,	636	4 4	6 0	—	—	3	19	16	21	26	22	17	18	23	11	176	171	5	—	8	3	9	383	2 7	—	
3	86	*White Leghorn*	Feb. 1	637	3 12	4 1	14	2	1	18	20	22	20	21	20	20	21	4	183	136	45	2	—	15	45	422	2 4	—	(a) 1,150 Eggs
		Mrs. M. O'Shea,	,,	638	4 1	4 7	19	17	19	15	19	23	22	23	24	24	23	7	235	132	99	4	1	51	150	564	2 3	—	(b) 27.1 oz.
		Farrantane,	Mar. 3	639	4 0	5 5	—	—	—	—	8	19	18	20	9	9	8	1	92	71	21	—	—	—	—	202	2 5	—	(c) 2,681 Points
		Castlegregory,	,,	640	3 12	5 0	6	20	19	16	19	19	24	25	23	20	22	4	217	201	16	—	—	45	135	525	2 6	—	
		Co. Kerry.	Feb. 1	641	3 5	4 8	—	—	15	21	21	21	25	27	26	22	23	9	210	25	172	13	—	11	33	456	2 1	—	
			Mar. 3	642	3 14	5 8	—	10	21	20	19	20	22	23	23	17	25	13	213	184	29	—	—	31	93	512	2 5	—	
4	96	*White Leghorn*	March	661	4 6	D	—	—	—	—	—	—	—	D	—	—	—	—	—	—	—	—	—	—	—	—	—	—	(a) 1,095 Eggs
		Mrs. P. Collins,	,,	662	3 13	5 8	17	24	23	23	20	21	21	24	18	23	20	11	245	96	136	13	—	52	156	570	2 3	—	(b) 26.0 oz.
		Pollinore,	,,	663	4 8	7 0	22	10	—	5	18	18	21	20	23	18	13	—	168	127	39	2	—	30	90	393	2 4	—	(c) 2,434 Points
		Corofin,	,,	664	3 9	4 12	20	21	21	20	24	20	22	20	19	20	18	9	234	15	184	35	—	45	135	484	2 1	—	
		Ballyglunin,	,,	665	4 0	5 4	23	20	19	20	21	22	23	20	20	20	23	10	241	28	175	38	3	35	105	484	2 1	—	
		Co. Galway	,,	666	3 13	5 4	11	14	15	17	19	19	20	25	18	20	20	9	207	188	19	—	—	40	120	503	2 5	—	

D = Dead.

SECTION V.—ANY NON-SITTING BREED—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1948	No. of Bird	Weight: On Arrival (lb. oz.)	Weight: At Close of Test (lb. oz.)	Eggs Laid: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs (oz. dr.)	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
5	87	*White Leghorn* Mrs. P. Walton,	Mar. 5	643	5 3	6 0	10	1	9	12	15	22	22	22	20	16	14	4	167	145	20	2	—	18	54	382	2 6	—	(a) 1,011 Eggs
		Ashtown Lodge,	,, 15	644	5 4	5 14	12	9	—	3	14	—	—	—	—	—	—	—	38	36	2	—	—	21	63	97	2 6	—	
		Castleknock,	,, 5	645	5 0	5 4	19	21	22	19	19	24	25	23	23	13	12	—	220	202	18	—	5	62	186	514	2 5	—	(b) 28.7 oz.
		Co. Dublin.	,, 15	646	4 13	5 2	20	6	9	22	23	22	24	24	22	24	22	4	222	185	37	—	—	35	105	529	2 5	—	
			,, ,,	647	5 0	6 1	14	15	13	7	21	20	21	17	15	15	6	9	173	165	7	1	—	41	123	415	2 7	—	(c) 2,388 Points
			,, ,,	648	5 0	5 10	12	6	1	18	19	20	22	19	24	19	21	10	191	184	7	—	—	19	57	451	2 8	—	
6	88	*White Leghorn* Mrs. M. Humphreys,	April 1	649	4 4	5 4	—	—	—	—	—	15	20	18	18	19	18	9	117	16	100	1	1	—	—	275	2 2	—	(a) 955 Eggs
		Lyre,	,,	650	4 2	5 2	12	9	16	20	20	21	18	20	23	19	17	10	205	49	147	9	—	29	87	467	2 2	—	
		Banteer,	,,	651	5 4	5 8	5	14	6	4	21	19	21	22	24	22	24	9	191	176	14	1	—	24	72	459	2 7	—	(b) 26.4 oz.
		Co. Cork.	,,	652	5 0	4 8	17	3	14	13	20	19	26	23	23	18	—	—	176	90	70	16	—	19	57	357	2 3	—	
			,,	653	4 0	3 8	—	5	19	2	16	23	23	22	18	20	18	6	172	29	137	6	—	23	69	395	2 2	—	(c) 2,179 Points
			,,	654	5 0	D	18	20	14	3	20	17	D2	—	—	—	—	—	94	44	45	5	—	48	144	226	2 2	—	
7	97	*White Leghorn* Mrs. M. E. Shanley,	Mar. 2	667	4 15	6 15	17	14	17	—	12	22	21	24	19	25	21	11	203	122	76	5	—	46	138	498	2 4	—	(a) 1,091 Eggs
		Drumard,	,,	668	3 12	4 7	21	18	9	—	12	20	23	23	23	18	21	10	198	25	134	39	—	39	117	395	2 1	—	
		Dromod,	,,	669	4 1	4 8	17	18	11	13	13	17	21	16	13	14	11	7	171	13	114	44	1	32	96	304	2 1	—	(b) 25.0 oz.
		Co. Leitrim.	,,	670	4 0	4 15	19	16	5	—	8	6	21	19	14	—	—	—	108	17	70	21	—	31	93	205	2 1	—	
			,,	671	4 12	6 3	19	23	15	3	—	6	24	26	24	22	24	10	196	95	92	9	—	49	147	478	2 3	—	(c) 2,135 Points
			,,	672	3 12	4 7	21	—	—	20	24	24	24	24	25	26	23	4	215	4	115	96	—	1	3	255	1 15	—	

D = Dead.

SECTION VI.—ANY OTHER UTILITY BREED—16 Pens.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1948	No. of Bird	Weight: On Arrival lb. oz.	Weight: At Close of Test lb. oz.	Eggs Laid: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1–Dec. 23	Full Period	Average Weight of Eggs oz. dr.	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
1	112	*Light Sussex* Mrs. M. Comerford,	Feb. 23	517	5 6	5 4	17	23	20	13	19	22	24	18	15	18	4	1	194	99	95	—	1	60	180	469	2 3	1	(a) 1,192 Eggs
		Lamogue,	,,	518	5 14	6 10	23	25	22	14	25	20	24	20	19	12	16	11	231	195	36	—	1	70	210	569	2 5	2	
		Windgap,	,,	519	5 3	6 15	—	3	21	18	18	4	21	8	16	13	9	7	138	35	101	2	—	24	72	325	2 3	1	(b) 26.8 oz.
		Thomastown,	,,	520	5 3	6 13	22	12	22	18	20	23	21	22	18	17	18	8	221	99	107	15	9	41	123	474	2 3	—	
		Co. Kilkenny.	,,	521	6 0	7 9	17	20	22	21	18	19	20	24	17	13	21	10	222	151	59	12	—	47	141	511	2 4	—	(c) 2,789 Points
			,,	522	5 8	6 14	—	11	19	12	21	21	24	16	21	8	22	11	186	157	28	1	—	30	90	441	2 5	1	
2	113	*Light Sussex* Mrs. M. Comerford,	Feb. 23	523	5 9	6 15	15	24	24	13	21	24	25	20	14	9	6	—	195	158	37	—	1	63	189	466	2 4	2	(a) 1,175 Eggs
		Lamogue,	,,	524	5 7	6 7	—	15	19	18	20	22	24	26	24	22	16	12	218	52	163	3	2	34	102	507	2 2	—	
		Windgap,	,,	525	5 10	7 8	22	21	21	20	23	19	25	20	19	15	12	4	221	83	127	11	1	53	159	501	2 2	—	(b) 26.8 oz.
		Thomastown,	,,	526	5 5	6 3	—	6	17	17	18	17	18	24	23	9	17	10	176	126	50	—	—	23	69	411	2 4	1	
		Co. Kilkenny.	,,	527	6 2	7 0	15	19	23	22	20	23	27	10	21	9	20	3	212	206	6	—	—	57	171	513	2 8	1	(c) 2,698 Points
			,,	528	5 13	7 8	20	9	—	—	14	22	24	22	5	12	14	11	153	7	119	27	—	16	48	300	2 1	1	
3	111	*Light Sussex* Mrs. M. Reeves,	Feb. 6	511	6 5	6 10	16	23	26	17	20	13	15	18	4	17	20	9	198	198	—	—	9	65	195	489	2 8	—	(a) 1,136 Eggs
		Knocksouna,	,,	512	5 8	6 0	—	15	24	19	15	10	8	13	11	13	11	—	139	138	1	—	—	39	117	341	2 7	4	
		Kilmallock,	,,	513	5 4	6 4	—	13	17	21	20	23	22	22	20	21	20	7	206	27	170	9	—	29	87	471	2 2	—	(b) 27.9 oz.
		Co. Limerick.	,,	514	5 12	5 9	23	24	23	21	21	22	21	23	17	19	14	2	230	164	66	—	—	70	210	565	2 4	—	
			,,	515	6 2	6 12	—	—	13	20	16	20	24	15	20	—	9	—	137	131	6	—	—	13	39	296	2 7	2	(c) 2,692 Points
			,,	516	6 7	7 0	23	22	23	17	23	20	26	13	23	13	13	10	226	110	101	9	—	61	183	530	2 3	1	
4	109	*Light Sussex* Miss L. Hely-Hutchinson,	January	499	7 3	7 3	14	18	19	18	21	24	22	12	10	25	7	8	198	194	4	—	1	51	153	485	2 8	2	(a) 1,115 Eggs
		Lissen Hall,	,,	500	6 8	6 8	20	20	20	6	13	23	20	19	17	8	10	6	182	177	5	—	5	60	180	438	2 8	—	
		Swords,	,,	501	6 12	6 12	8	—	9	15	19	19	22	21	12	15	15	7	162	160	2	—	—	17	51	378	2 8	—	(b) 29.0 oz.
		Co. Dublin.	February	502	6 8	6 4	12	—	1	20	20	25	24	22	21	24	17	10	196	171	25	—	1	13	39	454	2 6	—	
			,,	503	6 8	7 6	—	—	16	23	20	21	20	22	21	21	23	8	195	190	5	—	1	16	48	455	2 7	—	(c) 2,632 Points
			,,	504	6 12	6 12	—	—	—	18	16	20	23	23	24	23	23	12	182	123	59	—	—	—	—	422	2 5	—	

SECTION VI.—ANY OTHER UTILITY BREED—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1948	No. of Bird	Weight On Arrival lb.	Weight On Arrival oz.	Weight At Close of Test lb.	Weight At Close of Test oz.	Eggs Laid Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl. 15–May 12	May 13–June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading Special Grade	First Grade	Under First Grade	Non-Scoring Special and First-Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points Oct. 1–Dec. 23	Scoring Points Full Period	Average Weight of Eggs oz.	dr.	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
5	115	*Light Sussex* Miss K. Taylor,	Jan. 29	535	6	4	6	9	16	25	7	—	21	26	25	25	7	21	11	10	194	11	145	38	—	31	93	376	2	0	—	(a) 1,148 Eggs
		Deermount,	,,	536	6	6	8	4	15	11	13	17	19	24	23	20	21	20	23	10	216	10	180	26	—	23	69	451	2	1	—	
		Lissarda,	,,	537	5	8	6	8	—	17	21	5	16	21	21	13	9	14	10	4	151	21	100	30	—	27	81	292	2	1	1	(b) 25.2 oz.
		Co. Cork.	,,	538	6	0	6	9	—	23	8	13	23	23	23	16	14	18	15	1	177	74	103	—	—	31	93	419	2	3	1	
			,,	539	6	0	6	10	—	21	22	25	7	27	26	18	26	3	18	1	194	66	125	3	—	43	129	447	2	2	2	(c) 2,497 Points
			,,	540	5	12	6	8	—	17	21	21	23	22	22	20	21	19	19	11	216	73	140	3	—	37	111	512	2	3	—	
6	103	*Light Sussex* Miss E. Walsh,	Feb. 15	469	5	12	6	15	—	—	11	22	23	21	24	21	15	7	16	5	165	57	106	2	—	11	33	365	2	3	1	(a) 1,035 Eggs
		Ballylemon Lodge,	,, ,,	470	5	10	6	14	8	20	17	22	13	21	16	19	17	14	13	7	187	128	57	2	—	45	135	449	2	4	1	
		Cappagh,	,, 22	471	6	0	6	8	14	20	9	19	21	21	21	14	19	10	11	8	187	65	113	9	1	41	123	423	2	2	3	(b) 27.5 oz.
		Co. Waterford.	,, ,,	472	6	0	7	2	—	11	20	20	21	21	22	22	22	15	15	11	200	189	11	—	—	31	93	472	2	6	1	
			,, 15	473	6	0	7	14	—	15	17	16	16	18	9	14	—	—	—	—	105	74	29	2	—	32	96	238	2	4	—	(c) 2,423 Points
			,, 22	474	6	12	7	0	21	16	18	18	19	17	20	23	—	12	18	9	191	190	1	—	—	55	165	476	2	8	1	
7	117	*Australorp* Mr. J. H. Malcolm,	Feb. 10	541	6	4	7	8	—	6	17	18	18	19	26	21	15	13	16	8	177	169	8	—	—	23	69	414	2	6	1	(a) 993 Eggs
		Cahirleske,	,,	542	5	12	6	4	—	2	18	15	—	19	18	27	23	20	10	8	160	151	9	—	—	20	60	378	2	6	1	
		Callan,	,,	543	6	3	7	1	—	—	—	—	4	23	24	25	11	17	4	12	120	94	26	—	—	—	—	273	2	5	2	(b) 28.5 oz.
		Co. Kilkenny.	,,	544	5	14	7	1	24	20	—	—	16	21	21	25	23	18	23	11	205	199	6	—	1	44	132	503	2	6	1	
			,,	545	6	2	6	9	—	—	12	12	19	23	24	24	20	—	27	3	164	164	—	—	—	12	36	370	2	8	1	(c) 2,328 Points
			,,	546	5	12	6	2	—	—	6	19	4	12	25	27	22	20	22	10	167	115	52	—	1	6	18	390	2	4	—	
8	101	*Light Sussex* Miss E. Dixon,	—	457	5	8	6	2	10	11	12	10	16	16	19	15	9	14	18	9	159	125	31	3	—	30	90	383	2	5	—	(a) 939 Eggs
		Roseville,	—	458	5	2	5	4	9	—	17	19	8	18	16	14	7	7	14	3	132	33	96	3	—	25	75	307	2	2	1	
		Enniskeane,	—	459	5	5	6	8	2	22	22	20	18	23	24	24	15	7	12	5	194	122	70	2	—	46	138	454	2	4	1	(b) 26.9 oz.
		Co. Cork.	—	460	5	4	6	8	15	9	15	19	14	18	12	18	4	3	—	—	127	41	85	1	—	38	114	293	2	3	1	
			—	461	5	8	5	8	16	3	17	18	14	14	19	15	4	13	10	5	148	87	60	1	—	36	108	357	2	3	—	(c) 2,224 Points
			—	462	5	4	6	0	16	17	12	19	20	18	18	15	11	13	17	3	179	161	16	2	—	43	129	430	2	6	1	

SECTION VI.—ANY OTHER UTILITY BREED—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1948	No. of Bird	Weight: On Arrival lb. oz.	Weight: At Close of Test lb. oz.	Eggs Laid: Oct. 1-Oct. 28	Oct. 29-Nov. 25	Nov. 26-Dec 23	Dec. 24-Jan. 20	Jan. 21-Feb. 17	Feb. 18-Mar. 17	Mar. 18-Apl. 14	Apl. 15-May 12	May 13-June 9	June 10-July 7	July 8-Aug 4	Aug. 5-Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring Special and First Grade	Special and First Grade—Oct. 1-Dec. 23	Scoring Points: Oct. 1-Dec. 23	Full Period	Average Weight of Eggs oz. dr.	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
9	108	*Light Sussex* Sister-in-Charge,	Feb 12	493	5 0	7 4	2	21	2	20	21	21	19	9	—	—	—	—	115	47	66	2	—	23	69	249	2 3	—	(a) 929 Eggs
		St. Martha's College,	Jan. 25	494	5 0	6 12	—	17	20	19	20	20	16	20	18	11	13	7	181	128	53	—	1	37	111	427	2 4	—	
		An Uaimh,	,,	495	5 2	6 10	13	19	17	6	18	23	22	26	21	19	17	10	211	36	165	10	—	49	147	496	2 2	—	(b) 25.1 oz.
		Co. Meath.	,,	496	5 5	5 8	11	—	—	19	22	21	22	2	19	15	7	—	138	7	88	43	—	8	24	213	2 0	2	
			Feb. 12	497	5 4	D	—	4	18	8	19	16	20	—	D	—	—	—	85	58	27	—	—	22	66	192	2 4	—	(c) 1,978 Points
			,,	498	5 0	5 0	3	18	21	15	22	23	21	25	25	13	13	—	199	15	157	27	—	40	120	401	1 13	1	
10	105	*Light Sussex* Mrs. W. O'Neill,	Feb. 11	475	5 13	6 12	20	21	23	20	23	18	18	15	17	17	9	5	206	79	125	2	—	64	192	502	2 3	—	(a) 945 Eggs
		Killeen House,	,,	476	5 9	6 8	—	—	—	13	20	23	24	18	16	4	15	3	136	25	76	35	—	—	—	224	2 1	4	
		Ballybricken,	,,	477	5 12	7 4	11	13	11	8	3	4	—	—	—	—	—	—	50	5	35	10	—	28	84	108	2 0	—	(b) 25.4 oz.
		Grange,	,,	478	5 12	6 15	16	19	23	19	21	17	20	21	14	16	18	2	206	21	156	29	—	42	126	432	2 1	2	
		Kilmallock,	,,	479	6 1	7 0	19	15	20	16	3	16	20	9	17	10	15	8	168	149	16	3	—	54	162	416	2 6	2	(c) 1,952 Points
		Co. Limerick.	,,	480	5 8	5 12	12	9	21	18	19	15	19	18	13	16	14	5	179	7	106	66	1	33	99	270	2 0	—	
11	116	*Light Sussex* Sister-in-Charge,	Mar. 23	553	6 0	8 10	22	10	15	18	17	16	13	9	—	—	—	—	129	56	41	32	—	24	72	218	2 2	—	(a) 759 Eggs
		St. Mary's Abbey,	,, ,,	554	6 2	8 3	10	—	4	19	18	20	24	22	20	17	18	10	182	172	10	—	1	14	42	420	2 7	—	
		Glencairn,	,, 28	555	5 12	7 8	—	6	21	18	21	21	19	20	22	19	17	7	191	181	10	—	1	27	81	450	2 6	—	(b) 27.9 oz.
		Co. Waterford.	,, ,,	556	6 0	D	20	23	20	d11	—	—	—	—	—	—	—	—	74	21	44	9	—	54	162	184	2 1	—	
			,, ,,	557	5 12	D	—	—	D	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	(c) 1,732 Points
			,, 7	558	5 13	7 8	19	17	14	12	14	13	16	13	18	17	17	13	183	172	11	—	1	50	150	460	2 6	—	
12	107	*Light Sussex* Mrs. N. F. Forde,	Feb. 9	487	5 4	6 12	15	14	13	1	12	14	15	19	15	9	15	4	146	71	73	2	—	40	120	356	2 3	1	(a) 799 Eggs
		Corbally,	,,	488	5 12	7 15	23	18	23	18	12	18	13	4	14	5	10	—	158	14	94	50	—	30	90	261	2 0	1	
		Limerick.	,,	489	5 9	6 0	—	7	17	3	15	16	17	12	—	10	—	—	97	72	25	—	—	24	72	228	2 5	1	(b) 26.2 oz.
			,,	490	6 5	8 2	—	13	14	12	15	18	19	5	—	9	10	—	115	25	87	3	—	25	75	268	2 2	1	
			,,	491	6 3	7 10	8	20	19	7	17	18	18	23	23	17	12	—	182	177	5	—	2	47	141	435	2 7	—	(c) 1,602 Points
			,,	492	5 8	5 3	—	—	—	16	20	18	9	26	12	—	—	—	101	1	26	74	—	—	—	54	1 15	1	

D = Dead.

SECTION VI.—ANY OTHER UTILITY BREED—continued.

Order of Merit	Number of Pen	Name and Address of Owner	Date of Hatching in 1948	No. of Bird	Weight: On Arrival lb. oz.	Weight: At Close of Test lb. oz.	Eggs Laid: Oct. 1–Oct. 28	Oct. 29–Nov. 25	Nov. 26–Dec. 23	Dec. 24–Jan. 20	Jan. 21–Feb. 17	Feb. 18–Mar. 17	Mar. 18–Apl. 14	Apl 15–May 12	May 13 June 9	June 10–July 7	July 8–Aug. 4	Aug. 5–Aug. 18	Total	Grading: Special Grade	First Grade	Under First Grade	Non-Scoring Special and First Grade	Special and First Grade—Oct. 1–Dec. 23	Scoring Points: Oct. 1 Dec. 23	Full Period	Average Weight of Eggs oz. dr.	Number of times Broody	(a) Total Eggs from Pen. (b) Average Weight per dozen. (c) Scoring Points per Pen.
13	102	*Light Sussex* Mrs. C. MacDonald,	Jan. 21	463	7 7	D	—	—	—	15	d14	—	—	—	—	—	—	—	29	3	13	13	1	—	—	30	2 0	—	(a) 797 Eggs
		Laharan,	,,	464	6 10	7 0	25	21	2	6	7	27	11	20	—	7	18	1	145	107	32	6	1	47	141	349	2 4	1	
		Minane Bridge,	,,	465	5 0	7 2	21	22	23	21	19	23	23	23	17	19	20	10	241	122	112	7	—	59	177	576	2 3	1	(b) 25.1 oz.
		Co. Cork.	Feb. 7	466	5 8	7 8	14	11	—	10	20	19	24	23	9	24	21	9	184	—	20	164	—	5	15	48	1 13	1	
			,,	467	6 10	7 1	—	—	15	22	15	13	7	14	13	3	12	1	115	67	47	1	—	15	45	258	2 2	3	(c) 1,460 Points
			,,	468	6 2	8 4	21	15	15	13	5	—	—	—	12	2	—	—	83	35	41	7	—	45	135	199	2 2	1	
14	110	*Light Sussex* Mrs. E. B. Wilson,	February	505	5 10	6 0	14	—	14	25	19	20	25	28	18	10	12	2	187	1	63	123	1	9	27	141	1 15	—	(a) 798 Eggs
		Hermitage,	,,	506	5 8	7 6	—	15	9	12	18	14	12	—	11	9	2	—	102	100	2	—	8	24	72	217	2 7	—	
		Newtownmount-kennedy,	,,	507	6 0	7 4	—	—	—	14	16	19	21	24	17	17	17	4	149	148	1	—	5	—	—	321	2 7	—	(b) 26.8 oz.
		Co. Wicklow.	,,	508	5 4	7 2	—	—	—	9	19	17	24	24	23	13	14	11	154	78	74	2	—	—	—	342	2 4	2	
			,,	509	5 3	7 4	—	—	—	—	2	11	—	—	3	8	3	—	27	25	2	—	14	—	—	28	2 10	1	(c) 1,459 Points
			,,	510	5 1	6 0	21	18	20	20	20	19	17	21	—	—	10	13	179	86	83	10	—	56	168	410	2 3	1	
15	106	*Light Sussex* Mrs. W. O'Neill,	Feb. 11	481	5 3	6 10	—	—	—	16	17	14	10	17	9	9	17	8	117	100	17	—	—	—	—	268	2 5	3	(a) 699 Eggs
		Killeen House,	,,	482	5 8	7 12	15	18	16	12	11	11	11	3	—	—	—	—	97	21	69	7	2	46	138	222	2 1	—	
		Ballybricken,	,,	483	5 14	6 3	3	22	6	—	—	—	26	6	9	9	4	4	89	13	64	12	—	26	78	195	2 1	2	(b) 26.1 oz.
		Grange,	,,	484	5 5	6 12	—	18	23	19	20	21	20	11	12	3	16	3	166	68	94	4	—	38	114	384	2 3	2	
		Kilmallock,	,,	485	5 7	8 8	11	22	20	15	12	14	—	—	—	—	—	—	94	2	8	84	—	7	21	27	1 13	—	(c) 1,388 Points
		Co. Limerick.	,,	486	5 2	D	—	—	—	17	20	23	23	22	11	20	D	—	136	130	6	—	—	—	—	292	2 6	1	
16	114	*Light Sussex* Mrs. H. Horgan,	Feb. 28	529	5 10	D	15	12	10	12	12	3	—	—	D	—	—	—	64	—	17	47	—	10	30	44	1 14	—	(a) 691 Eggs
		Inchincurka,	,,	530	5 12	6 12	—	—	4	17	17	19	19	6	10	12	11	6	121	52	69	—	—	4	12	275	2 3	2	
		Dunmanway,	,,	531	5 15	D	—	10	20	15	8	—	18	6	—	D	—	—	77	8	51	18	—	27	81	145	2 0	1	(b) 25.1 oz.
		Co. Cork.	,,	532	6 0	7 14	—	—	9	25	22	23	19	25	19	14	4	—	160	5	89	66	—	8	24	205	2 0	1	
			,,	533	5 10	5 12	20	—	—	7	17	12	6	9	9	8	12	—	100	2	71	27	—	9	27	172	2 0	2	(c) 1,232 Points
			,,	534	5 12	6 12	—	—	16	16	21	22	24	15	18	14	13	10	169	109	60	—	—	16	48	391	2 4	2	

D = Dead

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